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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

Policy and Possibilities.

WE are gratified to find that the editorial articles and correspondence which have appeared in the "JOURNAL," on the subject of a constructive, looking-forward policy for the gas industry, have aroused much interest; and the gratification is enhanced when it is found that from behind the scenes in high quarters recommendations are issuing and advice is being tendered. We also know that the Central Executive Board of the National Gas Council will be pleased to receive suggestions bearing upon the question of elevating the efficiency of gas supply in those parts of the industry where, perhaps through circumstances of isolation and relative small opportunity, or old-fashioned plant and poor administrative methods, the gas service is not what it might be made by re-organization and a broader view respecting branching-out by concerns whose conditions are of a superior order. Pressing forward, with future expansion and economic consolidation in contemplation, is required to-day. We know that many men have been recently concentrating their minds on this subject; and we shall be surprised if, in the result, the Central Executive Board do not receive suggestions from more than one source. The Government electricity scheme conveniently provides an opportunity for putting life and new energy into hitherto somnolent parts of the industry. Let not that opportunity pass. The same scheme offers suggestion to the gas industry. Let us see whether use cannot be made of it.

The opportunity is such a splendid one that it must not be dealt with in any namby-pamby spirit. It is a time when a deliberate and organized attempt should be made to eliminate defectiveness by the installation of effectiveness, and the lead must be given by those in a position to take action. This view is found in a remarkably interesting article which is contributed to our pages this week by Mr. Harald Nielsen, on "Gas Supply in Bulk by Long-Distance Gas Transmission." He suggests team work by engineers, chemists, and physicists all pulling together. We have also further thoughts on the subject of "Policy" by Mr. W. R. Herring (see our "Correspondence" columns to-day), in which he suggests that an impartial tribunal should sit to determine the relative services that the gas and electricity industries can render the public from their respective points of view. It must not be overlooked that—whatever the fate of the electricity scheme—there will be a gradual unfolding of new conditions which the gas industry will have to meet, if it desires to maintain the maximum success. Should the Government scheme fail to meet with parliamentary approval, the concentration of electricity generation, the increase of transmission facilities from the larger central sources of production, the supply of electrical energy in bulk, and station interlinking, will still remain as a policy in the electricity supply industry. Motor-car ownership will also continue to expand; and, with this change in our social conditions, migration from towns and cities to more rural residential quarters will proceed—perhaps at an accelerated speed. That gas should be in good repute in the country areas is becoming more and more important to the gas suppliers in our cities and towns. The consumption of gas is increasing at the present time. But changes in our social and competitive states are going on all the time; we have to see that as those changes develop, so does our rate of service expansion. Changes in our social and industrial conditions and in the stringency of our competitive environment, are not going to be satisfactorily met by clinging tenaciously to old limitations and practices. A broader outlook is needful to-day—an outlook that progressively encompasses every change that is made which can directly or indirectly affect the interests of the gas industry. Any promising new prospect should be carefully and impartially explored by competent men, and not be regarded, as has been the tendency in the past, as simply another ripple on the industry's smooth methods of dealing with technical development.

There is another consideration, which should be an incentive to the gas industry to be moving into greater action on its own account, and bringing all the vision and economies possible to bear upon the future. It is a point which touches upon Mr. Nielsen's article in this issue. Men not directly concerned in the supply of gas have their eyes on possibilities in that direction. Gas undertakings make and distribute gas under Parliamentary powers. What Parliament has given, Parliament can take away. The "taking-away" has not been customary in this country; the sanctity of statutory enactment has been observed. But Parliament gave to the present electricity suppliers in the country rights of generating, distributing, and trading in electricity. Control and concentration in respect of generation, with long-distance transmission and station interlinking, were not considered or anticipated when those rights were granted; but they are to-day the cardinal features of the Government plans for the electricity industry. Let us not forget this in looking forward; the gas industry must have consideration for possibilities. The other day we saw a newspaper report to the effect that there was under consideration—by whom is not clear—a scheme for the utilization of the naval dockyard at Pembroke by its conversion into a large gas, electricity, and oil-producing centre. The gas and electricity, it was hinted, would be supplied to the distributors of those commodities over a large area. If Pembroke, why not Rosyth and Sheerness? We make no comment as to the feasibility or otherwise of such a scheme. But we know that the interest of the Government in low-temperature carbonization, and much of the work that has been proceeding at the Fuel Research Station, are largely due to their desire to render the country self-reliant in the matter of oil for the Navy in time of war. We do not know how such a scheme as the one referred to might strike the Admiralty and the Government. One cannot say where suggestions of this kind may lead. Look at those dockyards. They are all, if not actually in the centres of coal fields, very close to them. There is nothing, if thought fit, to prevent their being developed for the production from cheap low-grade coal of gas, electricity, and oil on a large scale—the existing gas and electricity undertakings acting as retailers. There are annual charges connected with these vast establishments which would go far to pay interest on a capital which there is little reason to doubt could be made productive. There is nothing definite about this. But is there anything against regarding it as a possibility?

This last matter is alluded to because it shows that there are men who are considering the question of the produc-

tion of gas in bulk; and this is linked-up at three points with Government interests—the largely discussed naval dockyards, the electricity scheme, and oil supply for naval purposes. We have referred to it also because it supplies illustration of the necessity for the gas industry looking forward and developing along the lines which will remove from it defects regarded as a national system, and develop its services to the best of standards to the utmost possible extent. There is not a single man of any standing in the gas industry who would desire a compulsory line of development laid down for it by the Government, as is intended for the electricity industry. Better by far that the industry should deliberately take steps actively to prosecute its own development so that in all parts it may be above reproach. As the present is surveyed, it is obvious that this is no time for timidity; it is a time that is peculiarly opportune for being up and doing.

Government Electricity Propaganda.

THERE were many matters of great importance to the proprietors of the Gas Light and Coke Company in the three speeches which the Governor (Mr. D. Milne Watson) delivered at the ordinary and extraordinary meetings last Friday. He spoke in millions and hundreds of thousands; referred to record increases in gas consumption; made allusion to the mutual healthy effects which would come from amalgamating the work and businesses of the big Company and the Brentford Company; spoke of the value of showrooms and of that of co-partnership; told how the 13,000 co-partner employees of the Company hold no less than £575,000 of capital; and mentioned other matters that the Board have in hand which will make more stable the value of the proprietors' stocks. This, in the circumstances of the times, will be an advantage not only to the stockholders, but to the consumers, through the assistance it will render to the raising of capital on good terms. The application of the Company for an increase in their standard price to 11·4d. per therm has been before such critical tribunals as the London County Council, the Corporation of the City of London, and the Middlesex County Council; and they have endorsed the fairness of the proposal in the changed conditions, which is sure to have due weight with the Board of Trade. Then there is the Bill which the Company have introduced into Parliament, and which contemplates, *inter alia*, the introduction of a minimum dividend of 5 p.ct. into the sliding-scale. This has, as the speech of the Governor shows, a strong case behind it, including the substantial support of a bitter experience. Parliament can have no desire to see the capital of an important industry wrecked, as was threatened during the war, by the unbridled operation of the sliding-scale. One other point in the Bill which has close relation to this matter of making gas stocks as popular as possible, is the proposal to change from £5 to £1 the multiples of stock at which transactions can be made in the market. The value of this to small investors and co-partners is obvious. All these and other matters—such as those dealing with new capital powers—were heartily endorsed by the proprietors.

But there is no question that head and front in interest for the stockholders was the part of the address of the Governor on the Government electricity scheme. The large amount of big drum beating there has been by the Government over this has had effects which probably they had not anticipated; and one of these effects (this in relation to the gas industry) indicates that—if the Government are going to utilize their powerful position to treat preferentially one industry to the detriment of another—it will seriously undermine the confidence of the public in industrial investment. The public will naturally wonder whether this electricity scheme is the beginning or the end of such political interference and folly in connection with industry and trade; and a feeling of insecurity will be generated, which will have more ill-results than the hypothetical "benefits" of (say) electricity generated at superstations at rock bottom costs, and transmitted and transformed at a cost which will completely submerge the economy realized at the initial stage. There is an assurance that there is to be no Government subsidy for the electricity industry; but there is the definite promise of the Prime Minister that there are to be guarantees similar to those granted under the Trade Facilities Act. That is a matter which may be of serious importance to the gas industry; and in this connection, the Governor submitted that the Government should in all fairness be prepared to give equal facilities to the gas industry.

These are questions with which the Governor dealt with statesmanlike moderation, and yet pointedness. He indicated also that it is the influence of Government intervention rather than the material issues of the scheme itself of which the gas industry justly complains. No sufficient reason has been adduced for that intervention. The Prime Minister himself has admitted that in the industrial areas of the country there can be no immediate (if any) benefit from the scheme in the way of economies; and so the Government have fallen back upon the excuse of committing the electrical industry to an enormous capital expenditure in order to make electricity supply available in the least electrically profitable areas of the country. That is a candid admission that anticipations have shrunk to a shadow of those originally conceived. As Mr. Milne Watson says, the gas industry does not look with any unfriendly eye upon the electricity industry; but what it does complain of is that the Government, who in all things should be impartial in industrial matters, especially where home industries are in competition, have taken the electricity industry under their wing, and have deliberately boosted its commodity to the detriment of an industry which has served the country well for over a century. What the Government have done in this regard has been the best advertisement the electricity industry has ever had, and it is tantamount to a very substantial subsidy; for to have obtained equal publicity by any other means would have cost the industry (shall we say?) hundreds of thousands of pounds, and then it would not have included the Government testimonial and signature, nor the supporting platform speeches and parliamentary activities of a Prime Minister and other Cabinet members. To have secured what has been done in this way for electricity, some of our industrial and commercial magnates would have paid a fortune. What therefore is claimed is that the Government, having lent their power and influence to the electricity industry in the way they have done, should rectify the injury inflicted upon the gas industry by giving equal prominence to its work, achievements, and productive and utilization efficiencies. The Government have been shown that, from the point of view of coal conservation, from that of efficiency and economy, from that of the thermal value given for money spent, the gas industry is serving the country in a way far superior to the electricity industry. Yet the Government persist in ignoring the gas industry, and continue to use their position and the resources of the State in boosting electricity—even to the extent of giving it a place in the speech from the Throne. Why is it? What is at the back of all this interest?

The Government cannot be so blind as not to see that the use they are making of their position on behalf of electricity must exercise an influence adverse to the gas industry. The mischief that has been done by them in this way it is up to them, if they desire to impress the nation with their impartiality and sense of justice, to take immediate steps to correct—as far as possible. Having done this, their next duty should be to cease boosting electricity, and to do what Mr. Milne Watson suggests—apply themselves to the problem of cheap coal. If they did this, they would be rendering a service to all the industries of the country without distinction. As it is, they are dabbling in a matter which it is obvious they do not understand, and over which (in respect of effects) it is equally plain they have been misled, with the result that their proposals do not commend themselves to competent technical men and industrialists (including electrical engineers) outside Government and departmental influence. We hope the plea of the Governor of the Gas Light and Coke Company, that the Government will show their disinterestedness by doing what they can to counteract the mischief already accomplished by their boosting of electricity, will receive the response which it is within their power to give. Such a response would do much to remove the impression that the Government have not in this matter shown the impartiality which is expected from men placed by the electorate in the highest position of responsibility.

Leeds University Appeal.

IT was very encouraging to be able to announce a fortnight ago that the Leeds University appeal for half-a-million pounds for the extension of the buildings and resources for meeting the demands made upon it had already passed the half-way line. It will be remembered that the appeal was organized on a very wide basis; and inquiry has brought us the information that the contributions have been made from all sorts of sources, and in sums ranging from thousands of pounds to shillings. Two characteristics of the appeal have proved of real service—viz., that contributions could be spread over a term of seven years, with a considerable saving from remission of income-tax; and that it was possible to secure the direction in which the fund, when obtained, was expended by ear-marking donations for particular departments of the University.

On the technical side, the Clothworkers' Company have continued their tradition by a further donation of £18,000, with additional annual grants. The West Riding Coal Owners have contributed £25,000, apart from individual donations. The most substantial contribution directly from the gas industry has been that of £2500 from the South Metropolitan Gas Company, who have always stood out, in the person of the late Sir George Livesey and that of his successor Dr. Carpenter, for the value of University training and research to the gas industry. The Gas Light and Coke Company have also generously contributed £1000; and the Institution of Gas Engineers, 500 guineas. A list of the donations and promises from the gas industry so far made is published in a later column. It is interesting to note in the list the appearance of the names of manufacturing and contracting firms connected with the gas industry, such as Messrs. George Bray & Co. (£1000) and Messrs. Drakes, Ltd., with a donation of 100 guineas, made through Mr. J. Wilfrid Drake. The British Gas Light Company continue their support of the University, as well as some of the Yorkshire Gas Companies, such as those of Harrogate and Scarborough. The district of Spenborough has been in connection with the appeal a splendid example of what can be done by a comparatively small but well-organized community; and this is reflected in the contribution of £200 from the Spenborough District Council Gas Department. The support of the Coke Oven Managers' Association and that of the Yorkshire Junior Gas Association can be taken as an expression of confidence from their members. It is reasonably expected that the list will be extended considerably during the next few months; and the association between the gas industry and the University of Leeds, so firmly established, will be made even more secure.

That so much has already been done in a time of general trade depression is an unmistakable indication that a conviction as to the value of University training and work is establishing itself throughout the community. This can rightly be said without belittling in any way the importance which attaches to the efforts made by friends of the University, which are helping that conviction to express itself in the most practical manner.

Government Programme—Coal and Electricity.

THE new, and what will be a momentous, session of Parliament was opened by His Majesty the King with a speech which the gas industry can wholly endorse, with the exception of one item. To an industry which is a heavy tax and rate payer, and which does so much purchasing business with other industries which also have to make considerable tribute to the national and local exchequers, there will be gratification regarding the reference to the proposals for effecting a reduction of public expenditure; and this satisfaction will not be lessened by the knowledge that Parliament will be asked to pass without delay the necessary measures to give effect to this excellent resolution. An announcement which had not been anticipated has relation to hours of labour. Invitations, it was stated in the speech, are being issued to the Governments of Belgium, France, Germany, and Italy to attend a conference in London to consider the advisability of securing an effective international agreement for regulating the hours of labour. In this connection, it was mentioned by the Prime Minister, during the debate on the speech, that he has always considered one of the most valuable methods by which we may hope to maintain our standards of labour in this country would be to get more uniformity among the principal manufacturing countries in regard to hours of work. The aim is forty-eight per week. The Miners' Federation, we know, are very keen on this subject; and the Miners' International Committee are going to discuss the matter, and try to make an effective arrangement which will remove some of the disadvantage which the seven-hour mining system in this country experiences owing to the longer hours and smaller pay in countries which have taken from us some of our export trade. We are afraid that nothing effective can be done in this way except by compulsory legislation in each country. It is curious that Labour, with its strong adherence to free-trade principles and objection to any form of protection, should favour something which will directly assail those principles. One argument for free trade is that the people are able to purchase imported goods at a cheaper rate than they can British-made goods—unmindful of the fact that the cheapness is secured by the sacrifice of employment in this country. Shorter hours of employment in other countries would do something to raise the prices for the goods imported by this country, which Labour prefers to "protect" in its own fashion on the ground of cheapness to the poor. On the other hand, strongly as they object to "protection," they are out-and-out in favour of the protection of hours of labour in this country by the reduction of the hours of labour in other countries. We are not saying that we disagree with the efforts to internationalize hours of labour in industry—the only point that is being made is that labour objects to any measure of protection for goods made in this country and for employment, while they do not object to agreements which will protect hours of labour in this country.

There was distinct gravity in His Majesty's allusion to the inquiry by the Coal Commission; and all patriots will warmly endorse the appeal made from the Throne in the expressive words: "I am well aware of the difficulties "that are inherent in the whole situation. But the in-"terests of the nation are paramount; and I appeal to "all parties to face the future in the spirit of conciliation "and fellowship, and to avoid action which would again "postpone the return of good trade and prosperity, for "which we have so long hoped." The electricity generation scheme found place in the speech. His Majesty intimated the introduction of a Bill to give effect to the scheme "with the object of securing greater economy and efficiency in the generation and transmission of electrical energy in the future." That may be the object; but the method of securing an object may be on totally erroneous lines. In this case, there is a flood of opinion antagonistic to the methods as foreshadowed by the Prime Minister and the Electricity Commissioners. There is little question that the Government now realize that their scheme is going to encounter severe opposition; for it is rumoured that early introduction of the Bill will be made not so much with the intention of hastening its passage, as to place before Parliament and the country the details of a scheme which it is to-day acknowledged will require the fullest and most earnest consideration that can be bestowed upon it. This does not say much for the confidence of the Government in the scheme, the several inquiries by Committees notwithstanding—inquiries in which the Electricity Commissioners have apparently been the dominating spirits. If the outline of the scheme has aroused so much antagonism on the ground that economy and efficiency will not be served, then, when the details are available, the scheme is likely to receive a shock which it will be unable to withstand. We rather think that before long, if they are not already possessed of serious misgiving, the Government will come to the conclusion that in this matter they have not been well-advised, and that the glorious picture of potential benefit that was skilfully drawn for them was much overdone. One of the Labour leaders has described the scheme as a "State crutch." This is not an altogether inapt description when it is realized that the foundation of the idea of its being productive of "economy and efficiency" is so obviously shallow. While enthusiasm for the electrical scheme appears to be on the wane, it is noticed that the Government have been criti-

cized for not announcing their intention to embark on a large low-temperature carbonization scheme. The Government are wise in not attempting a second piece of folly in one session.

Coke on the Hearth.

THE secret of obtaining the best results from gas coke as now made is (some of our mentors aver) to grade it, and use the appropriate size for the purpose for which it is required. In our "Correspondence" columns to-day, Prof. C. V. Boys tells us that, for the heating of the rooms of our houses, grading and screening is an unnecessary expense; and he speaks now from a long experience, which is confirmed by that of other people. But the coke must be used as Prof. Boys uses it. He has no grate. A grate is a redundancy, or rather a mistake; so is an ordinarily constructed well fire. What he did long ago was to remove the cast-iron grid from the well fire in his dining-room, fill up the ash-pit with common bricks to within about 1½ in. of the tiled hearth, and give them a fairly smooth and level upper surface. The crevices between soon got filled with ash, so that there is no under supply of air. On this hearth he builds his coke fire. That is all.

Prof. Boys described this method four years ago in the "JOURNAL"—Jan. 11, 1922, p. 81—and the reasons why coke burns so successfully on such a solid surface were discussed in our issue for Nov. 19, 1924 (p. 523). It is the hot floor on which the coke is burning that is one of the factors to success. Air passes over the hot floor, and so becomes heated before entering the sides of the coke fire, and this aids combustion. But there is another factor to success. Prof. Boys' fire declines to be pampered with screened and graded coke. It objects to prescriptions and uniformity; and its objection is so strong that it is fatal to oppose it. There have been attempts to use in it graded coke; and, this results in making, of what is a success in Prof. Boys' case, a profound failure. Success requires that the coke be supplied and used just as it is made—large, medium, and small all combined. Then all is well. The air for combustion, being preheated by passing over the heated hearth and the red-hot ash, enters the fire and leisurely passes through the interstices between the large pieces of coke, and so has time gradually to combine with the carbon. In fact, the major part of the air is utilized. With a strong draught, much air would pass through the spaces uncombined, and merely act as a cooling agent. Prof. Boys' letter contains other hints, which supplement the references of four years ago and those of fifteen months ago. Our correspondent is naturally surprised that such a simple, natural, and costless expedient for obtaining a glowing result from ordinary coke has not been tested and utilized to greater extent by the gas industry. A suggestion is made to provincial managers to have a specimen fire in their showrooms, and to arrange for one in the lounge or dining-room of a leading local hotel. Such demonstration, if there is compliance with the simple conditions as stated by our correspondent, should lead to great popularity.

There are, however, millions of homes in this country with many more millions of grates in them, which landlords will not pull out and reconstruct because of the expense, and ordinary tenants either dare not, or cannot afford the money to, make the conversion. It is for those grates (if gas-fires are not connected-up) that a coke of good igniting and combustible property is required. It is in those grates that a large part of 38 million tons of household coal is consumed in a year. There is good promise that a suitable coke can, with proper coal mixtures, be made for them without descending to low-temperature carbonization. But apart from such considerations, if one point was emphasized more than another by the contributors to the recent Coke Competition, it was the importance of grading coke accurately and suitably as a means to promote its preference for special purposes—such as water heating in domestic hot-water supply boilers of all the various sizes and makes now on the market. In many districts, this will be regarded as one of the most hopeful and desirable outlets for coke, forming as it does a steady demand not subject to seasonal changes. This consideration will therefore tend to increase the importance of the grading, and possibly the washing, of coke, and the installation of machinery for these purposes. In other districts—indeed to greater or less extent, in all districts—importance is attached to the potentialities of the open-fire demand; and while some authorities insist upon more or less accurate sizing and grading for this purpose also, others, as will be gathered from Prof. Boys' letter, are inclined to favour ordinary coke of a nondescript grade. Such preference no doubt is based upon personal experience with coke produced under different conditions, and from different coals, which affect materially its porosity, conductivity, and, therefore, its suitability for use under various conditions. Experience proves that relatively small variations in density and volatile content have a marked effect for good or ill in the behaviour of coke in the open fire. Such variations are obtained in practice not only as between one district and another, but also in different works in one district, using, possibly, different coals; and, as is well known, charges of different weights will produce coke which varies considerably in these fundamental characteristics. Safety, therefore, would appear to lie in the direction of uniform grading, which tends materially to offset any bad effect of such variations; but, similarly, trial and experiment made on the lines suggested by Prof. Boys will prove or disprove the suitability of any particular kind of coke for use, ungraded, on the lines he indicates. The Gas Light and Coke Company's coke exhibit at Wembley appeared to bear out the Professor's claim admirably in a well-grate adapted as recommended in his pamphlet on "The Open Coke Fire," 8000 copies of which, we are informed by the London Coke Committee, have been distributed in response to inquiries received by interested visitors to the Exhibition.

National Gas Council.

A general meeting of the National Gas Council will be held at the Great Central Hotel, Marylebone Road, next Wednesday, at 2.30. A large attendance is expected.

Coal Stocking.

The pithead prices of coal (through the subsidy) make liberal coal stocking a matter for consideration, with April 30 in view.

Taxing Gas and Electricity.

The Chancellor of the Exchequer is searching for ideas for increasing the national revenue. We hope he will not take a hint from the Turkish Government. Their Budget proposals, the "Electrical Review" states, include a tax of 10 p.ct. upon the consumption of gas and electricity.

Shareholders and Contracts.

At length the end has come to the long-drawn-out litigation in the case of *Lapish v. Braithwaite*, the issue in which was whether Mr. Braithwaite, an Alderman of the Leeds Corporation, was disqualified for membership of that body by reason of his holding of shares in, and being Managing-Director of, Messrs. B. Walker & Sons, Ltd., and other Companies having contracts with the Corporation. No suggestion of bad faith on the part of Mr. Braithwaite was made; and it was proved that he did not vote on any question relating to the contracts. It will be remembered that Mr. Justice Bailhache was in favour of the contention of the plaintiff; but his judgment was reversed by the Court of Appeal. The House of Lords has upheld the latter decision. To the Lord Chancellor it was clear that Mr. Braithwaite was not, under section 12 of the Municipal Corporation Act, 1882, disqualified for aldermanship by reason of his shareholding in the Companies concerned. His Lordship agreed that it might well be that, as a shareholder, Mr. Braithwaite had an indirect interest in the contracts, and so came within the terms of sub-section (1) of the section in question, inasmuch as the value of his shares and his expectation of a dividend upon them partly depended upon the profits which might be derived from the contracts. This, however, would not, his Lordship held, disqualify him for membership of the Council, seeing that it was expressly

declared by sub-section (2) that a person should not be disqualified by reason only of the possession of shares or interest in a company. Nor was he, under the same section, disqualified through being Managing-Director. If, however, Mr. Braithwaite had been remunerated by a percentage or commission on the profits arising from the contracts, or on the profits available for dividend, different considerations would apply. But his Lordship failed to find from the evidence that the respondent was entitled to any percentage or commission.

Imported Electricity.

There is one thing the gas and electricity industries of this country do not suffer from, and that is the importation of supplies of their primary commodity to compete with the home product. The "Electrical Review" has been informed that in Switzerland considerable anxiety exists regarding a rumour that Italy is going to tax imported electrical energy. It is not strange, in view of the available water power, to learn that for some years electricity has been a very important "article" of export from Switzerland; the power provided for Italy during last year being about 76,000 KW. Several power stations have been set up specially with a view to exporting electricity to Italy; and if the latter country taxes Swiss energy, the suppliers will be faced with unexpected difficulties. The "Review" understands that the proposed tax will be 30 p.ct. of the wholesale price of the electricity, which is considered excessive in electrical circles; but as the Italians are determined, so far as lies in their power, to "protect" Italy, it is probable that the new duty will be as high as the figure mentioned. Our Government are not likely to have to add either the electricity or the gas industry to their "safeguarding" list.

Gas Charges to Develop Consumption.

The National Gas Council have a Committee sitting considering the question of differential prices for gas—by the allowance of special discounts for gas supplied in large quantity or for special uses, such as power purposes; also whether the dividends of sliding-scale companies might properly be calculated upon the average price of gas. The references to the inquiry which have been seen seem to limit it to "differential" prices or discounts. We have heard that it is (and it is hoped this is correct) within the province of the Committee to inquire and report upon the feasibility of applying a two-part tariff to gas supply, as some gas undertakings have done in America, and as many electricity supply concerns have done in this country. There are several points which, on first blush, appear to commend, as a measure for developing gas sales, particularly for heating, a two-part tariff—a fixed payment, and a supplementary low charge per therm. The secondary charge per 100,000 B.Th.U. would appeal strongly to consumers, compared with that for electricity supply per 3412 B.Th.U.

Coal Conference Prospects.

A fair amount of confidence seems to exist that it will be possible before long to arrange for a meeting between representatives of the coalowners and the Miners' Federation, with a view to attempting to discover means whereby a stoppage of the mining industry at the end of April may be averted. To-morrow there is to be a meeting between the Mines Department and the Executive of the Miners' Federation, when various matters affecting the position of the industry will be considered. Speaking last week at an international Conference at Geneva, Mr. Herbert Smith, the President of the Miners' Federation, expressed the hope that it would be possible to avoid a stoppage in the British coal-fields. He acknowledged that this would be a national catastrophe, and would bring suffering not only to the miners, but to the community at large. At the same time he declared that the miners ought not to be asked for a reduction of a single penny from their wages, or to work a minute longer per day. He is also hopeful that, at the next international conference, there will be a declaration for a universal seven-hour day from bank to bank in the coal industry of the world.

The Road Fund.

It is stated that Mr. Churchill is not yet in a position to place before the Cabinet his proposals with regard to the Road Fund and the future scale of motor taxation. One Parliamentary correspondent states that the Chancellor has abandoned the idea of limiting the size of the Road Fund to £15,000,000 as the maximum sum to be spent on road work in any one year. He is now prepared to see the proceeds of motor taxation flow into the fund as heretofore; but he has not altered his view that there should be some contribution from it to general national purposes. It is also alleged that Mr. Churchill is prepared to allocate £750,000 to the maintenance of rural roads, and that he has definitely decided to increase the taxation on heavy road vehicles. In Parliament, there is a disposition to hasten some definite pronouncement on this subject, and not to dilly-dally with it any longer. One of the Unionist members (Mr. A. C. Dixey) has given notice of a resolution in the following terms: "That, in the opinion of this House, no part of the Road Fund should be utilized for any other purposes than the repair and maintenance of roads and bridges." It is expected that there will be an opportunity for a debate upon this resolution next week.

Coal Merchants' Propaganda.

Recently we had issued a stupendous scheme by the Miners' Federation, the Council of the Trade Union Congress, and the Labour Party for the consideration of the Royal Coal Commission and the country generally in respect of the nationalization of the coal industry and its extension into one for the supply of power, heat, bye-products, chemicals, &c. In the course of the remarkable document, the Miners' Federation and their allies indicated their view that the consumption of raw coal without separating it into its constituent parts for the benefit of the community and the industry of the country was something which, in their enlightened view, was most uneconomical. We see from a prettily illustrated folded card that the coal merchants do not agree with them. These gentry are again attacking gas and electric heating, and pressing the consumption for household purposes of raw coal which the Miners' Federation are clearly and properly of opinion it is most wicked to burn in its raw state.

Healthy Heating and Other Points.

The card tells us that the "ever present danger of gas" makes it entirely unsuitable for a nursery. Moreover, such rooms require to be ventilated in the best way; and the best way, the coal merchants contend, is by the draught of a coal fire. The ventilation of a nursery is well secured by a gas-fire without the smoke, dust, and waste associated with the consumption of coal, to say nothing of the visits of the chimney sweep. Thus, with the gas-fire, healthier conditions are actually obtained. Another picture shows the love-making between young man and maid before a coal fire; and our coal merchants, apparently having had a large experience of this sort of thing, submit that there is no romance in a gas-fire or a glaring electric radiator, and that a coal fire is the most "beautiful of all fires"—with its smoke, dust, and other inconveniences. Then for the old folk, the "peaceful pipe and the pleasant companionship of friends are best enjoyed not round a stuffy gas-fire or glaring electric radiator, but by a good coal fire." We were unaware that the modern gas-fire was "stuffy;" the coal merchants, in this as in coal fires, are positively antiquated. What we were aware of is that elderly people find the labour-saving qualities of gas-fires, as compared with coal fires, a highly commendable feature. On another page we read that it costs 8d. to heat an ordinary room for fifteen hours with a coal fire. A gas-fire for the same time costs 2s. 3d.; and an electric radiator 8s. The gas fire is only used as and when required; and it does not cost in these circumstances more than the coal fire—taking a house through, probably less. Such unsupported comparisons as the coal merchants make are absurd. No information is given as to what is an "ordinary" room; no figures are vouchsafed regarding the relative capacities of the three types of heating appliances, nor mentioned are the prices charged per ton, therm, and KW.-H. for the three commodities. Postulation of the kind cannot be checked; and the public will therefore simply look upon the statement as the product of prejudice. If the coal merchants will favour us with information on the points referred to, we will discuss the relative costs and the whole question of comparative economy.

PERSONAL.

Mr. JOHN LANG, of Thornton, Bradford, who for 40 years was in the employment of the Bradford Gas Department—of which 23 years were spent as Manager of the Clayton Works when taken over from a private Company—and his wife, celebrated their Golden Wedding anniversary on Feb. 5. Mr. Lang is now living in retirement.

Mr. JOSEPH SADLER, representative of Messrs. John Wright & Co., of Essex Works, Birmingham, has been re-elected Chairman of the Newport and Monmouthshire Commercial Travellers' Association. The Commercial Travellers' Benevolent Institution have also made him an Honorary Life Governor in connection with the Monmouthshire Branch. It is interesting to note that his wife has been elected Chairman of the Ladies' Section, and Honorary Life Governor of the Commercial Travellers' Schools.

OBITUARY.

JOSEPH FISHER.

His many friends in the South of England will deeply regret, with us, to learn of the death of Mr. Joseph Fisher, Chief Assistant Engineer of the Tottenham District Light, Heat, and Power Company, which occurred at his residence, 49, Maidstone Road, N. 11, on Friday last, the 5th inst. Mr. Fisher became Assistant Engineer at Tottenham in the year 1909, when the position was vacant in consequence of Mr. John Terrace having been appointed Engineer and Manager to the Grimsby Gas Company. At one time, he was with the Bristol Gas Company, in charge of their Canons' Marsh Works, and later with Messrs. Corbet Woodall & Son. When selected for the Tottenham Assistant Engineership, he was in charge of the erection of works for the Imperial Continental Gas Association at Hoboken, Antwerp.

In 1912 Mr. Fisher was elected a member of the Institution of Gas Engineers, and in 1915 an associate member of the Institution of Civil Engineers. He was, of course, also a member of the Southern Association of Gas Engineers and Managers, in whose proceedings he took an active part. It was not very long after his appointment to Tottenham that he read before the last-named Association a paper on "Reinforced Concrete for Gas-Works," accompanying it by tests on model beams, of a character which was explained in the text. This revealed a knowledge of his subject that was also apparent in the contributions to technical discussions which, in his quiet and unassuming style, he from time to time made.

At the meeting of the Eastern Counties Gas Managers' Association in May, 1917, Mr. H. J. Randall, of the Yorktown and Blackwater Gas Company, referred to a simple device patented by Mr. Fisher and Mr. Fiddes, and in July of the same year an illustrated description of the invention appeared in the pages of the "JOURNAL." It was an apparatus originally designed—but in a different form—for the removal of dust from the producer gas required for heating vertical retorts at Tottenham; but, with slight modifications, it was adapted to the removal of tar fog both from coal gas and carburetted water gas. For the latter purposes it was then stated to have been found very effective.

ELECTRICITY SUPPLY MEMORANDA.

THE outpouring of adverse criticism of the Government scheme has been filling many columns of the electrical journals; and a very small measure of space has been sufficient to satisfy the supporters of the scheme—such as the "Electrician," which, in an article in its issue for Jan. 29, reminded its readers three times in a single column of things they or other people have "forgotten," and made indirect charges against units of the industry of being mercenary and neglectful. It has no doubt that, as a matter of fact, there are electricity supply undertakings who would like nothing better than to be left alone to develop individually, to charge excessive prices, and to bask in that comfortable warmth which follows the payment of high dividends and large contributions to the rates. Also commenting on a statement by a financial paper, that "the electricity industry can do all the Government propose to do, if only allowed to, and without any recourse to the taxpayer," our contemporary says "the plain fact is that for the last six years, it [the industry] has had that opportunity, and has not taken much advantage of it." Naughty industry! The industry will probably not take much notice of these ripples of censure from the "Electrician."

Thin Support.

Robust Criticism.

It is more refreshing to turn from thin comment to robust criticisms of the scheme, which impress one with their healthy, logical soundness. We are confident that these criticisms will do much to increase the wave of opposition to the scheme from within the electricity industry itself, for there can be little question now that this is the capital stone to the so-called restrictive legislation against which the men of the industry have long rebelled. What they dearly want, and what they assert they cannot get, is more freedom. Reference has already been made in the "JOURNAL" to some of the adverse criticisms levelled against the scheme. We have another by "Rusticus" in the "Electrical Review," in which the writer shows by a concrete example that the cost of supplying a small area with current from a super-station, including the costs of transmission, would be greater than generating locally. He asks the pertinent question whether the cost of making efficient the small stations has ever been gone into, compared with the cost of the super-stations *plus* that of transmission lines? Until this is ascertained, is it, he asks, worth while spending millions of money to reduce the cost of generation, which reduction would be wiped-out over and over again by the obligations involved by the expenditure on, and the losses of, transmission? And this for less than half the electricity supplied in the country. A long critical review is also made in the same contemporary by Mr. F. J. Moffett, which may be summed-up by the statement that in the main the Government proposals are all wrong, both from the technical and the economic points of view. From other correspondents—also criticizing the stupendous capital commitments which the scheme involves—there is strong resentment to the national control which is plainly contemplated, but which the Premier in his Birmingham speech denied. But one has only to look at the string of controlling bodies which are being brought into, or are already in, being to see that denial will not stand close examination.

A Resolute Critic.

A striking letter is that of Mr. C. S. Davidson, of Barnes, which has appeared in the "Electrical Times." He thinks it is time the electricity supply industry should speak with force and frankness before being irretrievably committed to a scheme in which a very large proportion of electrical engineers have no belief, and which they feel is likely to be productive of harm. He refers to the scheme as an "upheaval," and asserts that there have been too many politicians and officials and too few electricity supply engineers engaged at the conception of this new and hapless child. His examination of available figures leads him to point out that assuming 0·5 lb. of coal per unit of electricity generated could be saved throughout the country, it would mean an economy of 1½ million tons of coal per annum. Valuing this at 10s. a ton at the pit head, the sterling saving would be £750,000 per annum. It has been variously estimated that the proposals of the Government would involve a capital expenditure of £60,000,000. It will thus be seen that the £750,000 would be of little value in providing the charges on such an outlay. Mentioning the constant lament that the volume of imports exceeds that of exports, Mr. Davidson is surprised that any political party should father and foster a scheme whereby a reduction in the consumption of our native coal would be counterbalanced by the use of large quantities of costly imported copper. Another point he makes is with regard to the extensive publicity which has been given to the differences between the consumptions of electricity *per capita* in this country and in other countries. He says many quaint deductions could be made from false premises—such as the variances between the customs of America and this country. In the United States there are more central heating systems; and, as anyone who has lived in that country knows, this has been a stimulus to the installation of electric radiators. While Mr. Davidson admits that electricity charges up and down the country vary greatly, he asserts that the super-station is not likely to alter this condition. He regards the bait of reductions in price held out to consumers of electricity as being nothing more than a piece of window-dressing, which is not likely to be very attractive. A further belief on his part is that there is no authority in the country who would not welcome the proposed scheme and rush for a bulk supply if there was assurance of financial advantage. But what is found at the present time is that quotations given for bulk supply are too ridiculous for any efficient, small, or medium-sized undertaking to consider; and he can see a feeling of instability and insecurity being engendered by the stipulation that such prices as are agreed to are to be subject to periodical adjustment by the Electricity Commissioners. Regarding compulsory powers, he makes the following remarks:

> It is a tacit admission of the suspicion of the Government that their electricity supply scheme, so loudly trumpeted, may not after all be so super-attractive and all-conquering as it seemed when first mooted; for they now intend to grant Soviet-like compulsory powers to the Commissioners to rope-in with the rest those who are not too keen to commit commercial suicide. This surely is reactionary. Already the Commissioners are in possession of far too great powers; and it is suggested that there should be a court of appeal more assuredly unbiased and freed from the shackles of official policy to adjudicate on the financial advantage or otherwise of a bulk supply to any authority. The present procedure and that proposed under this scheme do not inspire confidence.

In concluding his letter, Mr. Davidson remarks that influences other than the desire for the conservation of the nation's natural

resources, or to distribute a cheap and abundant supply of electricity, must have been at work in the promotion of this scheme.

Hired Electric Cookers.

Not long since, we had Mr. R. Hardie, of Glasgow, confessing that a weakness in connection with electric cookers was that of maintenance; but he was hopeful that as time passed this would be largely eliminated. The subject of maintenance was referred to in the "Cooking and Heating Notes" of the "Electrical Times" for the 21st ult. It seems that, in a number of types of electric-ovens, the makers have merely used plain sheet-iron interiors, which are prone to rust through so rapidly that replacement has been necessary in the short space of twelve months or so. We do not know that the makers of such cookers could expect anything else in view of the large amount of evaporation from food cooked in an oven, and the chances there are for corrosion. Now, however, the general tendency among the manufacturers is to provide an enamel finish for oven interiors, or to utilize rustless material. Of course, enamelled oven linings have been in use in gas-ovens for ages; but a rustless iron interior is something about which more experience will be necessary before coming to a final decision respecting the desirability of its use. Another point is that it has been found that the expensive electric cookers are in the end the most economical—even for hiring purposes—in view of the lower cost of maintenance. The writer of "Cooking and Heating Notes" also stated that the better appearance and quality of finish of the good-class cookers appeal so strongly to the housewife that there is no difficulty in commanding for them a higher rental per quarter.

Electric Fire Standardization.

"A Station Engineer" has made complaint in the "Electrical Review" of the multiplicity of designs of electric fires. He finds that, in the old-established gas industry, the apparatus makers have seen the advantage of introducing standard designs of cookers and fires; and he thinks it high time the makers of electric fires got together, and produced a few standard models. He does not wish to limit them in regard to the appearance of their fires, or the type of heating element; but, in his opinion, they should quickly arrange to let the industry have a standardized element—of course, of the plug-in type. For years the makers have, nearly every season, changed their elements; and yet, with a large experience in eight different undertakings, "Station Engineer" has yet to come across a burnt-out element which has consisted of a fireclay former built-up in multiple with steel supports of some sort, with the heating spirals wound-on without any pinning to the fireclay. Second in point of reliability has been the old 500 and 600 watt fireclay bar, with the spiral run in vertical grooves, and hooked at top and bottom. This is now being superseded by the 1000-watt bar; and he is afraid it is with this the makers change their designs so frequently. Some of them have succeeded in producing a 1000-watt solid bar element, with the fireclay support so designed that no pinning or clipping of the heating element is required. It is with this type that "Station Engineer" has had nothing but trouble, owing to "hot spots" developing. It is, he says, "no easy matter to stretch-out the spiral to the necessary length, fit it in the grooves, and then insert several dozen small split pins, and still keep the turns evenly spaced to prevent "hot spots." One maker uses no fewer than 44 small split pins in a 1000-watt bar; and it is an impossibility for the average contractors' electrician satisfactorily to fit a new spiral under forty minutes. The critic hopes the makers will confer together, and decide on a standard plug-in bar—standardized as to distance between the centres of the plug-in pins, and as to width. What he desires is that in a few years it will be possible for one to walk into a shop and take home a 500 or 1000 watt plug-in bar, and fit it just as easily as a lamp.

Two-Part Tariff Limitations.

Some electricity undertakings are finding that the two-part system of charging cannot be fairly applied to all conditions. The Liverpool Corporation Electricity Committee, for instance, are of opinion that it would be difficult to adapt it to offices, in view of the great variation in assessment values; and so they incline, in such cases, to a continuation of the flat-rate charge. They explain that in winter the load comes on the peak, and therefore must be subject to the full capital charges. Again, in Accrington, it has been decided that small shops with residences attached shall not have the privilege of paying on the two-rate basis, as considerable loss would result.

The "Ideal" Home.

The Electrical Development Association are making no secret of their plans for the Ideal Home Exhibition. They are proposing—whether they will succeed, the event will show—to make their exhibit one of the chief attractions of the popular display at Olympia. They contemplate illustrating an old-fashioned kitchen and a modern kitchen—"modern," we take it, in respect of the electric fittings, with all their attendant expense. There will also be an old-fashioned living room, and a "modern" living room. In addition, there is to be an "up-to-date" bedroom and laundry. The published information says that visitors will thus be able to appreciate by contrast the comfort and convenience obtainable to-day by electrical means, but utterly unthought of a few generations ago. A complete range of appropriate electrical appliances in operation is to be placed in each apartment. A special feature is to be the lighting; and the heating will be by the most modern types of radiant fires. In the kitchen, cookery demonstrations will take place daily. Water heating is to be a feature of the bath-room. There will also be the usual multitudinous little electrical devices on view.

Safety!

Deaths have been recorded on previous occasions through the presence of electricity in bathrooms; another has been reported. This was the death of Mrs. Martha Kleeman (age 26), of Langland Gardens, Hampstead, who was found dead in a bath. When she was discovered, a pair of slippers was alight beside an electric radiator in the room. A representative of the Electricity Supply Authority stated that the stove showed signs of overheating; and there had been a fusion. The slippers were very fluffy; and he was inclined to believe that they were placed in front of the stove, caught alight, and burned some of the insulation from the wire, which allowed the metal frame work to become electrified. Mrs. Kleeman would then get a shock if she touched the stove. Dr. Bronte, a pathologist, stated that as Mrs. Kleeman was in her bath, she would get a very much greater shock than if she had been standing on the linoleum. The immediate cause of death was heart failure from fatty degeneration of the heart muscles, brought about by shock. "Death by misadventure" was the verdict recorded. We learn from Leicester that on the 27th ult. two men, while working an electric drill at the Leicester Corporation Power Station, received shocks, and were rendered unconscious. One recovered; the other died before medical aid arrived. On the 20th ult., a fire "believed" to have been caused by the fusing of an electric wire, practically destroyed Iha Downe, Alton, the residence of Captain W. G. Lowndes. One evening last week, a fire broke out at the Swansea Electricity Station; and the supply of current was stopped completely. Partial lighting was restored, after a quarter of an hour. The supply, however, was insufficient for the tramways and works purposes, business was considerably interrupted, and shops and offices were left in semi-darkness. Full lighting was not restored for three-quarters of an hour; and it was over an hour before the tram service was again running.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Feb. 13.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Wandsworth Works of the Wandsworth Gas Company.

Feb. 13.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to the Oakbank Oil Works.

Feb. 13.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Meeting. Paper on "Municipal Gas Undertakings, Finance and Accounting," by A. Philip.

Feb. 13.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION. Visit to the Cardiff "Better Housing and Housekeeping Exhibition."

Feb. 17.—NATIONAL GAS COUNCIL.—General meeting at the Great Central Hotel, Marylebone Road, 2.30.

Feb. 17.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, at 2.30 p.m.

Feb. 18.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—Meeting at Cardiff. Paper by W. M. Mason on "A New Spirit in an Old Industry." Visit to the "Better Housing and Housekeeping" Exhibition.

Feb. 26.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Short Paper Evening.

Feb. 26.—NORTHERN STAR LODGE.—Meeting at the Midland Hotel, Manchester.

Feb. 27.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Street Mains Section of the Glasgow Gas Department, Dalmarnock.

March 5.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—General meeting at the Midland Hotel, Manchester.

March 9.—NATIONAL GAS COUNCIL.—Meeting.

March 9.—FEDERATION OF GAS EMPLOYERS.—Meeting.

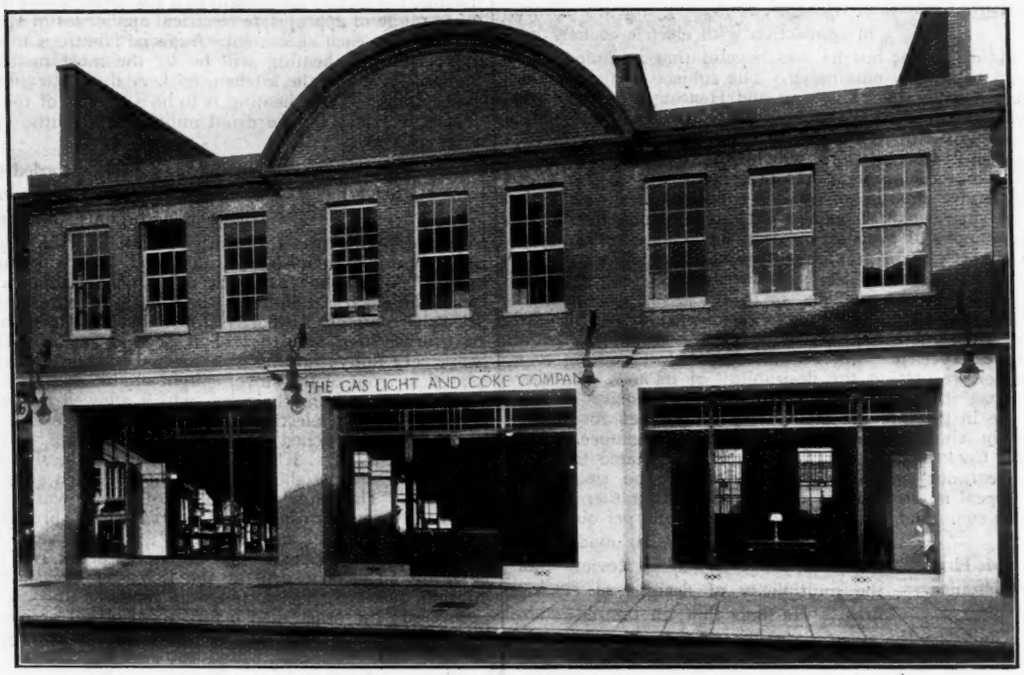
March 19.—MURDOCH LODGE No. 3480.—Installation meeting.

March 23.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual General Meeting at the Hotel Cecil.

May 6.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring meeting at Ipswich.

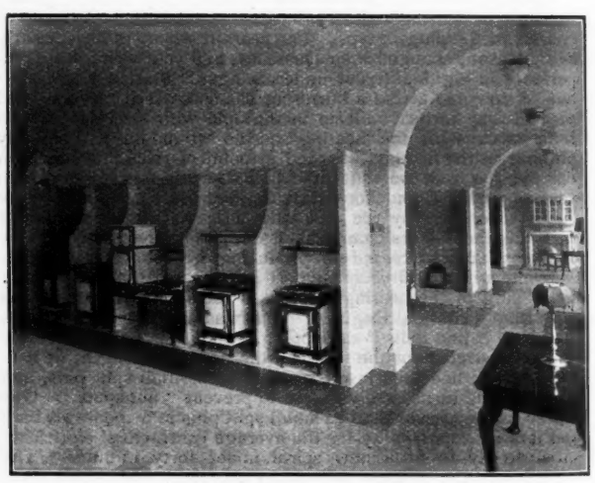
GAS LIGHT AND COKE COMPANY'S GOLDERS GREEN SHOWROOMS.

Described on p. 291 of the "Journal" for Feb. 3.

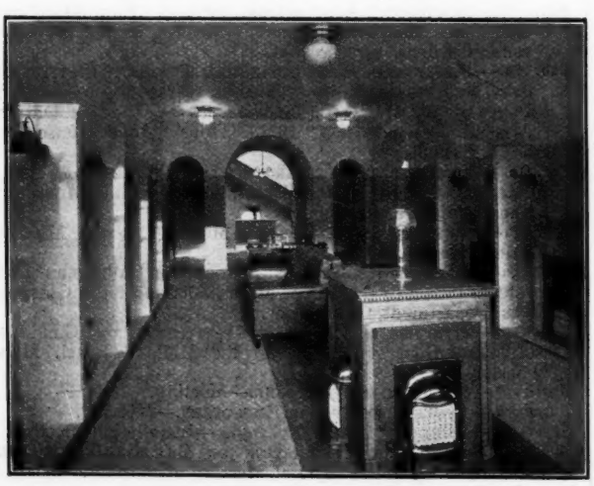


WINDOW SPACE FULLY OPEN TO THE SHOWROOM.

Facilities for Payment of Accounts.



Apparatus separately displayed for Inspection.



Gas Lamps with Switch Connections.

View on First Floor.

GAS SUPPLY IN BULK BY LONG DISTANCE GAS TRANSMISSION.

By HARALD NIELSEN.

It is a generally accepted fact that the generation of electricity in bulk at large central stations, where ample fuel and water supplies are to hand, and its subsequent distribution over wide areas by a high tension net, will not only effect great economies in generation, but, when cheaply delivered, the electricity will materially assist industrial undertakings to recover lost trade and improve conditions generally.

There are many problems to consider in connection with a scheme of this nature, not least that of bringing into line the scores of different voltages, continuous or alternating currents, different phases of cycles, &c.; but the solution will be found eventually, and light and power will be available for all at economic prices. The same cannot truly be said of the economic heat supply by a super electric scheme. Heat in the form of gas is, and always will be, the cheapest and most convenient. There are some ideas of supplying heat in the form of hot water and exhaust steam in connection with the power plant, but this would hardly be feasible except in very special circumstances, and can be ruled out as applying to ordinary conditions.

There remains, then, gas or a solid fuel. The gas supply today in this country is essentially a district concern, very largely municipally or locally owned and operated. There are a great number of declared calorific values, different, but varying only between comparatively narrow limits—say, between 420 and 520 B.Th.U.—so that there is no reason why a standard gas of 475 or 500 B.Th.U. should not take the place of the former values, as there would be no necessity for altering the users' appliances or the district distribution. Here are no 25 or 50 cycles, or "one" or "three" phases, to worry over; so, compared with the electrical engineer, the gas engineer can rub his hands in self-satisfaction over the easy job in front of him, if he has to tackle a long distance bulk supply of gas.

We know all there is to know about the district supply. Let us examine more closely the possibilities of producing a suitable domestic or industrial gas at a group of collieries, favourably situated, and sending the gas away for a distance of (say)

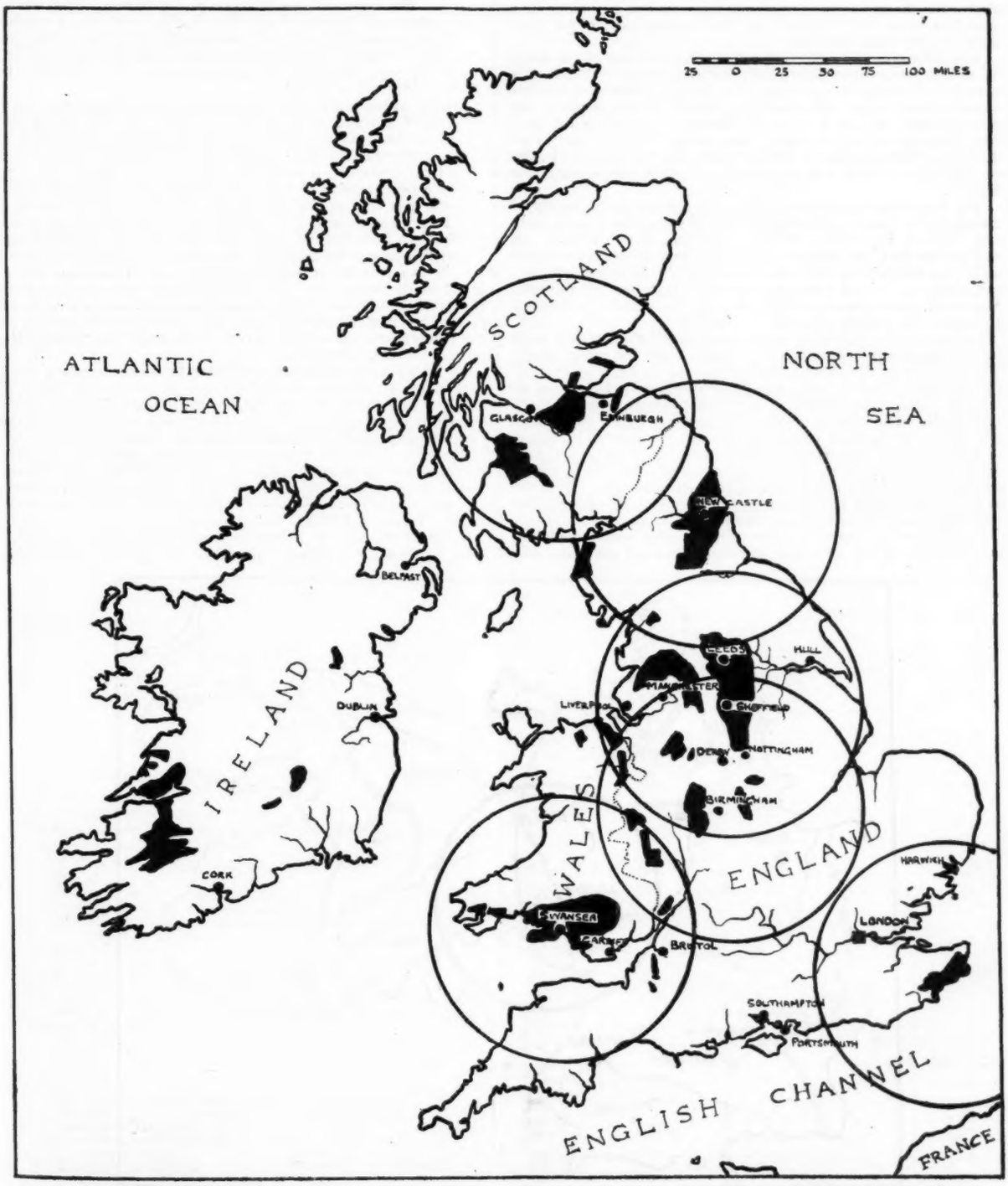


FIG. 1.

75 miles to a large town, and distributing through the existing service mains.

The mere fact that the long distance transmission can be, and will be, tapped on the road for supplying the intervening districts with heat commodities enhances the scheme very much. But we will not go into these details here; we will stick to the idea of sending a definite quantity of gas of the most economic value to the consumers a definite distance, and delivering it into the holders of the town's gas-works (say) 75 miles away from the generating station.

The reason why the writer has selected 75 miles radius is simply because circles with a 75 miles radius from the prominent coal districts will cover the main industrial and agricultural population of Great Britain. A glance at the map, fig. 1, shows this. Furthermore, there is in existence very complete information on long distance transmission of gas over this length, not only from America, but also from Germany, and there are practical experience available and data obtained over a great number of years, proving beyond doubt the feasibility and the practical side of the question.

What we will therefore try to elucidate will be whether or not gas, generated by very large scale operations, under the most scientific and rational conditions this country can produce, can, therm for therm, be delivered into the terminal gasholder at a cost less than that at which the local works can deliver local gas into the same holders.

The time taken in collecting reliable data for the closer study of this problem must necessarily be considerable. While this article was under preparation, the Prime Minister made his speech on the large electrification scheme. Some people in the gas industry, to use a common phrase, "got the wind up." Mr. Herring wrote his highly interesting letter to the "GAS JOURNAL," and the Editor of the "JOURNAL" produced a leader on the subject which will probably go down in gas development history.

The interest of manufacturers and consumers in the supply of cheap gas in bulk is awakening; and if some few proven facts and figures regarding existing practice, coupled with an attempt to find the cheapest form of therm to be made available, together with a few notes regarding the technical side, are put forward, it will probably stimulate this healthy interest. Somehow, the writer considers the time he spent in collecting the data not entirely wasted.

Let us select a couple of well-known installations which have been in successful operation on a large scale for many years. There is one in Westphalia, Germany. As far back as in 1913 the Stinnes Collieries and Coke Ovens delivered, by means of long distance transmission under high pressure, gas to forty townships. The length of the high-pressure pipe system was 270 miles, the diameter of the pipeline ranged from 16 in. down to 8 in., and the gas transmitted had a calorific value per c.ft. of 570 B.Th.U. In 1913 alone 2625 million c.ft. were transmitted and sold to a population of 2½ million people. The cost of the gas delivered to the terminal holders or low-pressure distributing centres was 1·9d. per therm.

To-day the main trouble of the German coke ovens supplying long distance gas is that they had made forward contracts, extending over a number of years, with the various municipalities for the gas supply, basing their prices on the normal requirements and development of the steel trade for their oven coke. Now, unfortunately for them, the demand for coke, owing to the universal trade slump, is decreasing, while the gas demand is increasing, so the oven people are, so to speak, between the devil and the deep blue sea; but the gas has to be transmitted just the same.

This lesson points to the undesirability of having a public necessity, such as gas, depending more or less upon something which will fluctuate within such wide limits as the world's demand for steel and iron will from time to time. Therefore, the gas production should not be governed by outside conditions over which no control can be exercised. The sole ruling factor should be the demand. That is to say, the production should be carried out uninterruptedly under the most economic conditions, for the ultimate benefit of the consumer and manufacturer alike, if the gas is going to be of assistance in developing and supporting industry, which it can do when properly manufactured, delivered, and utilized.

In the early spring of last year, a very important Congress was held in Essen—in fact, a National Congress. The object was to attempt to find a solution to the coal trouble in Germany. The foremost people representing mining, coke ovens, gas-works, and distillation practice were present, and a number of highly interesting and well-considered papers were read and discussed. Among them a most able paper dealing with the aspect of long distance gas transmission was contributed by Rich. F. Starke, of Essen.

Owing to the low-grade coal, containing on the average 15 to 18 p.ct. of ash and 10 to 12 p.ct. of moisture, now being produced in that country, it became of paramount importance to find out whether, in view of this as well as the increased cost of railway transport, it would not pay to extend greatly the long distance transmission of gas by high-pressure mains, and generate the gas only at the coal areas. As distances in Germany are far greater than in this country, it was a question of transmitting gas from the two main coal centres—*i.e.*, the Ruhr and Upper Silesia—to the middle of Germany, or a distance of about 400 to 450 kilometres (250 to 280 miles). The map, fig. 2, indicates the main idea. Mr. Starke's paper was received with the greatest interest, and it is not too much to say that in all probability it will form the basis for a State action as soon as the Government over there can see their way clear through the present financial difficulties.

As far as America is concerned, we have the excellent work of Thomas R. Weymouth and Forrest M. Towl. In David T. Day's "Handbook of the Petroleum Industry," there is an excellent, clear account of a series of tests carried out on the long distance gas transmission from the Pennsylvania oilfields to Buffalo. This test was made in order to ascertain whether Weymouth's formula for flow of gas really did give figures which could be relied upon for long distance transmission. The test was a great triumph for Weymouth's work (see Weymouth, Trans. A.S.M.E., Vol. 34, 1912).

E. O. Hickstein ("American Gas Engineering Journal," Feb., 1918—see "JOURNAL" for April 23, 1918, p. 148) carried

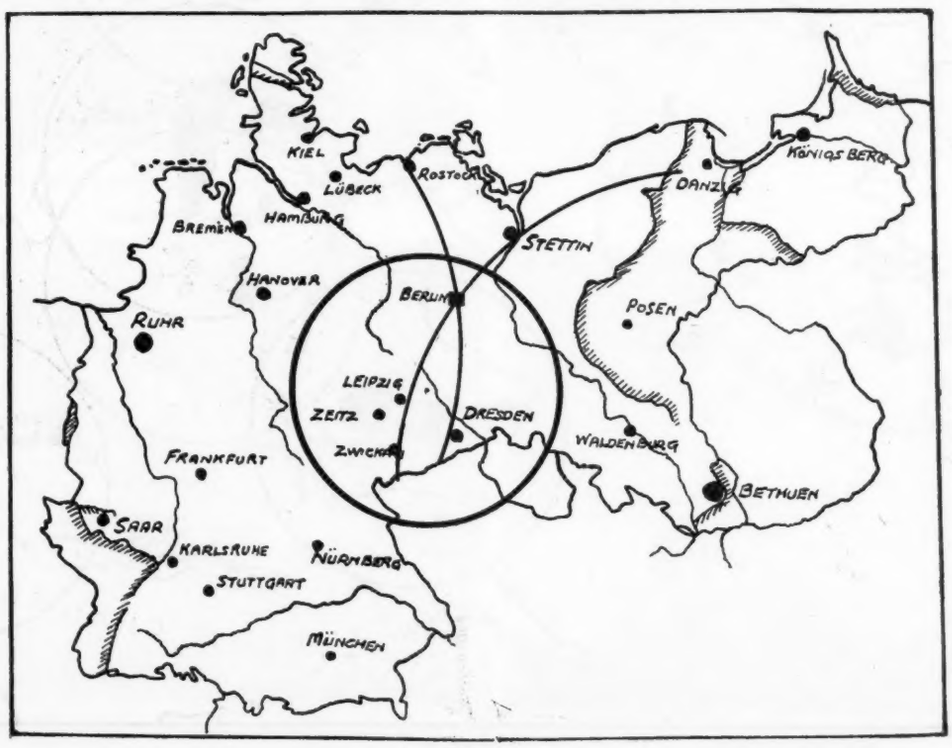


FIG. 2.

out a great number of tests on lines ranging from 2 in. diameter up to 18 in. diameter and at pressures varying from vacuum up to 300 lbs. pressure per sq. in., and found Weymouth's formula correct in each case.

The writer proposes to mention briefly Weymouth's formula. For further details David T. Day's book, and Weymouth's work, referred to above, should be consulted.

Flow of Gas in Pipes.

If Q = the flow of gas in c.ft. per hour at standard temperature, T_o degrees Fahr. Absolute, and standard pressure, P_o lbs. per sq. in. Absolute, then

$$Q = 1{\cdot}616 \frac{T_o}{P_o} \times \sqrt{\frac{D^5 (P_1^2 - P_2^2)}{G.T.f.L.}} \quad . \quad (I.)$$

where

T = absolute temperature of flowing gases in degrees Fahr.
G = specific gravity of gases referred to air.
L = length of pipeline in miles.
P_1 = initial pressure in lbs. per sq. in. Absolute.
P_2 = end pressure.

The friction coefficient f has an average value of

$$f = \frac{0{\cdot}0084}{D^{\frac{1}{3}}}$$

where D = diam. in inches and the pipes are steel or wrought iron, with the usual finish from the tube works.

When introducing the value for f in (I.), we have:

$$Q = 18{\cdot}06 \frac{T_o}{P_o} \times \sqrt{\frac{D^{5\frac{1}{3}} (P_1^2 - P_2^2)}{G.T.L.}} \quad . \quad (II.)$$

For any particular gas flowing at ordinary temperatures we have:

$$Q = K \times \sqrt{\frac{D^{5\frac{1}{3}} (P_1^2 - P_2^2)}{L}} \quad . \quad . \quad . \quad (III.)$$

$$\text{when } K = 18{\cdot}06 \frac{T_o}{P_o \sqrt{G\,T}} \quad . \quad . \quad . \quad . \quad . \quad . \quad (IV.)$$

The figures usually employed for natural gas long distance transmission are:

T_o = 60 + 460 = 520° Fahr. Absolute.
P_o = 14·65 lbs. per sq. in. Absolute.
T = 40 + 460 = 500° Fahr. Absolute.
G = generally 0·65, air being 1.
K = therefore 35·56 for hourly flow or 853·5 for 24 hours' flow.

Formula (III.) may be written thus:

$$Q = A \times \sqrt{\frac{P_1^2 - P_2^2}{L}} \quad . \quad . \quad . \quad . \quad (V.)$$

when $A = K D^{2\frac{2}{3}}$

Table I.—*Values of A (hourly flow) for various Pipe Diameters on above Conditions (David T. Day).*

Diameter of Pipe in Inches.		A =
2	..	242 8
4	..	1,459·0
6	..	4,349
8	..	9,046
10	..	17,110
12	..	26,840
16	..	50,850
18	..	70,660
20	..	94,660
24	..	156,600

Other forms of the formula V. are:

$$P_1 = \sqrt{P_2^2 + L \left(\frac{Q}{A}\right)^2} \quad . \quad . \quad . \quad (VI.)$$

$$P_2 = \sqrt{P_1^2 - L \left(\frac{Q}{A}\right)^2} \quad . \quad . \quad . \quad . \quad (VII.)$$

$$L = \left(\frac{A}{Q}\right)^2 . (P_1^2 - P_2^2) \quad . \quad . \quad . \quad . \quad (VIII.)$$

$$A = Q \times \sqrt{\frac{L}{P_1^2 - P_2^2}} \quad . \quad . \quad . \quad . \quad (IX.)$$

For intermediate values of A, see curve, fig. 3.

The figures relating to the Buffalo pipe test were the following, according to David T. Day.

P_1 = 210 lbs. per sq. in. Absolute.
P_2 = 41 " " " " "
D = 7·981 in. = standard 8-in. pipe.
V_1 = initial velocity = 12·5 ft. per second.
j = weight of 1 c.ft. of compressed gas at start = 0·7362 lb. (weight of gas per c.ft. at N.T.P. = 0·05136 lb.).
L = 70 32 miles.
f = 0·003645.
Q = 5,300,000 c.ft. of gas per 24 hours.

The curve, fig. 4, giving the pressures for steady flow conditions along the pipeline under the above conditions, is plotted according to formula:

$$\frac{P_1 - P_2}{w} = 4 \cdot f \cdot \frac{d}{l} \cdot \frac{u^2}{2g} \quad . \quad . \quad . \quad . \quad (X.)$$

where

P_1 = initial pressure (inlet) Absolute in lbs. per sq. in.
P_2 = end " (outlet) " " " "
w = specific weight of gas.
u = mean velocity of flow.
l = length of pipe.
d = diameter of pipe.
g = acceleration due to gravity.
f = coefficient of friction.

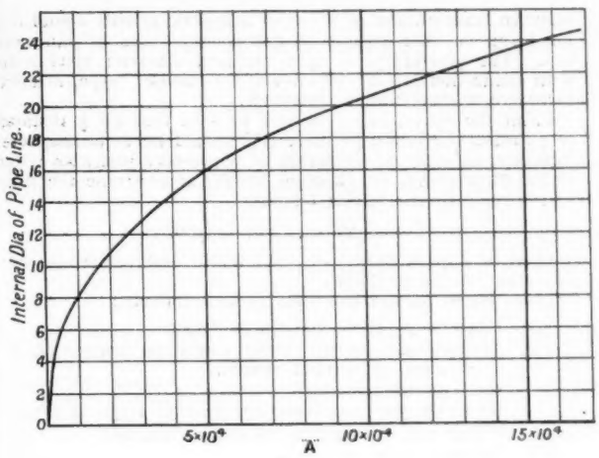


Fig. 3.

Note.—In long distance transmission of gas, the temperature is practically constant, hence the flow is isothermal. The drop in pressure produces a decrease in density with a corresponding increase in velocity. Furthermore, numerous tests have shown that the friction coefficient f varies little from the above-mentioned figure.

Later work by Fromm confirms the Weymouth friction coefficient (see Fromm Z.f.ang.Math und Mech., Vol. 3, 1923, pp. 353 and 357).

Gas Compressing.

The compressing of gas is so well known that there is no necessity to enlarge on this particular subject here. The writer

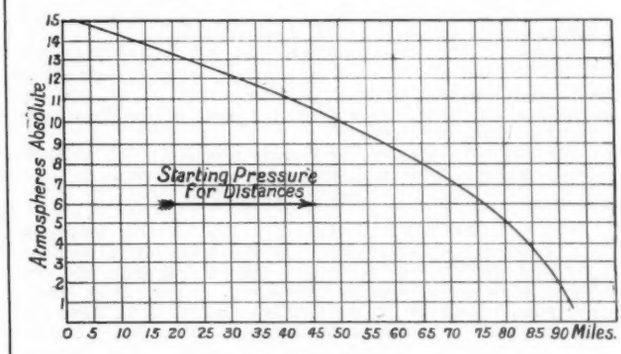


Fig. 4.

has converted Rich. F. Starke's figures to cubic feet, and they will be found in Table II.

Table II.—*Power Consumption for Compressing Gas. Per 1000 C.Ft. Hourly.*

—	Reciprocating Compression. Compressor Only.		Electric Motor, including Gearing.
	H.P.	KW.	KW.
Two stage—			
15 atmospheres Absolute .	4·46	3·281	3 725
20 " " .	4·92	3·620	4·140
25 " " .	5·31	3·910	4 460
Three stage—			
30 atmospheres Absolute .	5·75	4·225	4·820
40 " " .	6·15	4·525	5·160
50 " " .	6·50	4·775	5·470

Note.—The above figures are based on large compressing units each capable of dealing with 700,000 to 800,000 c.ft. of gas at N.T.P. hourly.

The curve, fig. 5, gives the initial starting pressures for long

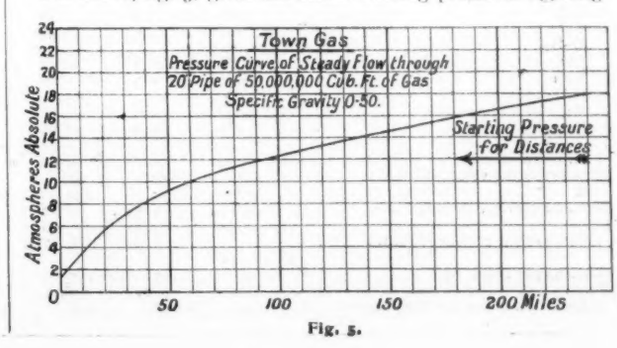


Fig. 5.

distance transmission of a gas of a specific gravity round 0·5, air being 1. The volume of gas per 24 hours is 50,000,000 c.ft. The pipeline is a 20-in. internal diameter steel main with connection of the well-known "Victaulic" type, in order to assure a minimum of resistance.

From the curve, fig. 5, it will be seen that for a distance of 75 miles the initial pressure (P_1) should be 11 atmospheres Absolute, in order to discharge at a pressure just above that of the atmosphere, or, in other words, to overcome the pressure thrown by the terminal holder.

GAS TO BE TRANSMITTED.

There is a great variety of gases which could come into consideration for transmission.

There are at present five main groups—namely:

I. High-temperature gas comprising—
   (*a*) Ordinary straight town gas from horizontal, inclined, or vertical retorts.
   (*b*) Gas from chamber ovens.
   (*c*) Coke oven gas from the different types of ovens.
II. Water gas (straight blue) non-carburetted.
III. Producer gas.
IV. Low-temperature gas.
V. Mixed gases.

Rich. F. Starke takes up for discussion (Zeitschrift des Vereines Deutscher Ingenieure, Vol. 69, No. 17, April, 1925) the following cases: Coal gas, water gas, producer gas, mixed coal gas and water gas, and mixed coal gas and producer gas. The latter two gas mixtures are sub-divided into those which will produce a mixed gas of: (*a*) 475 B.Th.U., (*b*) 365 B.Th.U. Thus there are seven different cases in all.

Since low-temperature distillation will, according to the writer's belief, play an important part in the future economics of this country, he has extended the possible cases to ten, so that we have to consider at present the main groups and mixtures of these which will give us useful heating values.

Table III. gives particulars of the analyses of gases, calorific value, specific gravity, p.ct. of mixture, &c.

Table IV. states the volume of gas and total products obtained per ton of raw coal in order to enable a thermal, as well as a commercial, balance to be arrived at, so that due credit can be taken for the different products from the various manufacturing processes.

We will now consider the various cases, 1 to 10, independently, without, however, going into too much detail.

1. HIGH-TEMPERATURE GAS.

This relates to the production of a high calorific town gas, 522 B.Th.U. per c.ft. gross, in the very latest chamber type plant dealing with about 4000 tons of coal daily, and producing from same about 50 million c.ft. of gas per 24 hours. The plant is situated in the middle of a colliery district, and the very latest type of coal handling and labour-saving machinery is employed. Arrangements are made so that the gas plant takes the coal output as it is delivered from the pits, without any storage of coal, except what is required in order to cover any fluctuations in deliveries over week-ends. The coal is delivered into the plant bunkers at 12s. per ton. The raw coal has an average calorific value of 280 therms per ton. The gas produced is delivered into a governor holder, and from this sent direct to the compressing plant. Credits are taken for the bye-products at mean figures over a considerable time period.

The coke has a calorific value equal to 258 therms per ton. The net quantity is disposed of at the works at the same prices, therm for therm, as that at which the coal is delivered into the bunkers—equivalent to 11·06s. per ton.

The coke may be delivered for boiler fuel for an adjoining super-power station. In these circumstances a large gas station and an electrical power plant can be admirably linked up, so that the colliery district sends light, power, and heat to a large town, 75 miles away, as well as supplying the whole countryside between the two points.

The figures entering into the calculation of the cost of the therm transmitted are:

Depreciation and maintenance, 15 p.ct. on capital.

	£	s.	d.	
Value of H.T. tar	2	15	0	per ton.
,, ,, benzole	13	15	0	,, ,,
,, ,, spirit wash oil	2	15	0	,, ,,
,, ,, fresh wash oil	6	10	0	,, ,,
,, ,, sulphuric acid	1	15	0	,, ,,

Labour, 8s. per shift per man.

Local rates and taxes have not been considered, as these will vary, and depend upon the district.

Under above assumptions, a therm of H.T. gas of 522 B.Th.U. value per c.ft. can be delivered into the governor holders at 3·06d. at the works.

2. WATER GAS.

This gas is produced from the high-temperature coke obtained, and, taking everything into consideration, can be delivered into the governor holder at 1·95d. per therm. The gas producers are of the latest self-clinkering and automatic change-over type.

3. PRODUCER GAS.

This gas is also made from the high-temperature coke in modern rotary grate producer machines, and can be delivered into the holder at 1·85d. per therm.

4. LOW-TEMPERATURE GAS.

This gas is produced by the "L. & N." process of distillation (sensible heat distillation). The same raw coal as before is dealt with (12s. per ton delivered).

The semi-coke has a slightly higher calorific value, about 270 therms per ton, and has, therefore, a value of 11·3s. per ton.

The oil yield is taken at 17·5 gallons per ton of coal, and has been assessed at 5d. per gallon—a value which recent research work has shown is below the mark.

No credit is taken for any sulphate produced under the above conditions. The gas therm can be delivered into the governor holders at 1·245d.

Note.—The purification cost of the high-temperature and low-temperature gas is taken to be 0·13d. per therm.

For comparison, the cost of production of 500 B.Th.U. gas at several large existing gas-works was looked into, and found to be 3·43d. per therm. The gas-works were so situated that although the coal was obtained at a price of about 12s. per ton at the pit, the cost of rail transport, wagon hire, loss in transit, handling, &c., amounted to 8s.—or the coal was de-

TABLE III.—*Gas for Town Purposes.*

	Types of Gas (Basic Gas).				Mixed Gases.					
					Gross Calorific Value, 475 B.Th.U.			Gross Calorific Value, 365 to 366 B.Th.U.		
	Coal Gas.	Water Gas.	Producer Gas.	L.T. Gas.						
Gas No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Mixed gases consisting of:										
Coal gas, p.ct.					76·14	87·25	68·90	23·86	59 31	..
Water gas, p.ct.					23·86	..	26·94	76·14	..	86·65
Producer gas, p.ct.					..	12·75	..	..	40·69	..
L.T. gas, p.ct.					..	..	4·16	..	..	13·35
Gas composition, p.ct.:										
CO_2	2·0	4·6	3·65	5·20	2·6	2·2	2·80	4·0	2·7	4·60
O_2	0·1	..	0·20	0·80	..	..	0·12	..	..	0·17
C_nH_m	2·4	..	..	2·00	1·8	2·1	1·65	0·6	1·4	0·03
CO	13·0	39·7	29·12	8·40	19·4	15·1	20·05	33·0	19 6	35·72
CH_4	24·8	0·5	0·20	47·20	19·0	21·7	19·21	6·3	14·8	6·78
C_2H_6	0·0	..	..	4 20	..	..	0·17	..	..	0·56
H_2	50·0	50·8	9 88	26·40	50·2	44·9	49 20	50·6	33·7	47·54
N_2	7·8	4·4	56·95	5·80	7·0	14·0	6·80	5·2	27·8	4·60
P.ct. inerts in gas	9·90	9 00	60 80	11·80	9·60	16 2	9·72	9·2	30·50	9·37
Gross calorific value, B.Th.U.	522	317	136	675	475	475	475	366	366	365
Net ,, ,, ,,	467·5	292	132	610	425	425	425	335	332	334
Specific gravity, air = 1	0·43	0·53	0·90	0·56	0·46	0·49	0·43	0·51	0·62	0·54
Volume of gas produced, c.ft.	12,500	31,600 0·58t.	81,300 0·58t.	3360 0·63t. Coke.	16,420	14,200	14,800	2,650 HTG 41,450 MG	21,080	25,160
Therms per ton of fuel	65	135	157	22·7	78	67·5	70·5	164·8	77·0	92·0
Fuel.	Coal.	Coke.	Coke.	Coal.						
Calorific value per ton fuel, therms	280	258	258	280						

TABLE IV.

—	Types of Gas (Basic Gas).				Mixed Gases.					
					Gross Calorific Value, 475 B.Th.U.			Gross Calorific Value, 365 to 366 B.Th.U.		
Products obtained other than gas, after deducting fuel requirements.	Coal Gas.	Water Gas.	Producer Gas.	L T. Gas.						
Gas No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
H.T. tar, gallons per ton	8·0	..	..	..	8·0	8 0	6·53	8·0	8·0	
H.T. motor spirit, gallons per ton from gas	1·67	..	..	..	1·67	1·67	1·36	1·67	1 67	
H.T. coke, tons	0·500	..	..	..	0·508	0·567	0·310	..	0·518	
H.T. ammonium sulphate, lbs. . .	24·4	..	..	..	24 4	24 4	20·0	24·4	24·4	
L.T. coke				0·630			0 142			0 23t.
L.T. oil, gallons per ton				16·20			3·00			16·20
L.T. spirit, ,, ,, ...				1·30			0·24			1·30
Total therms recovered per ton of dry fuel	230	172	190·0	234	224·6	229·1	225 7	180·4	226·6	182 0
Thermal efficiency, p.ct.	82·2	66·6	73·5	83·6	80·0	81·8	80·5	64·3	81·1	65·0
	From one ton of raw coal. As stated.	From net coke after H.T. distillation = 0·58 ton. 99·8 therms.	From net coke after H.T. distillation = 0 58 ton. 110 therms.	From one ton of raw coal. As stated.						

livered into the gas-works situated in the towns at about 20s. per ton.

NEW "L & N" GAS.

The above list of different kinds of suitable gases would not be complete unless the writer mentioned the result of some new and important developments which have recently taken place in the "L & N" process as applied to town gas manufacture.

One of the bugbears connected with the application of low-temperature distillation to town gas practice in the eyes of gas engineers, who are accustomed to produce from 65 to 70 therms of gas per ton of coal, has been the relatively low yields in gas therms by such processes generally.

By externally heated retorts, any attempt to increase the gas yield can only be done at the cost of the oil yield; and if cracking is to be prevented as far as possible by these processes, the gas yield will never exceed 18 to 20 therms. Hence a large amount of volatile matter, representing 10 to 12 p.ct. by weight of the coke, must of necessity be left in the semi-coke. The corresponding therms which by the high-temperature process could be recovered as gas therms, and sold as such, must now be sold at the rate of coke therms—that is to say, at anything between 1·2d. to 1·5d. per therm, as against 8d. to 8·5d. in gas form. This, naturally, makes a vast difference in the balance-sheet.

It was decided to carry out some investigations in order to ascertain whether by the "L & N" process of distillation it would be possible to obtain a maximum yield of gas therms without in any way jeopardizing the quality or the quantity of primary oils obtained.

Semi-coke containing from 10 to 12 p.ct. of volatile matter was distilled by Dr. Baker in the Sensible Heat Distillation Company's laboratory; and it was found that a further large volume of gas could be obtained by employing temperatures at round 900° C., reducing the volatile percentage to 1·5 to 2. It was also found that the reactivity and easy combustibility of the coke was not interfered with in any way.

Table V. gives particulars of the low-temperature gas, as well as of that given off by the semi-coke at 900° C.

TABLE V.

Coal I. is a Scottish non-coking coal.
,, II. is a coal from the Doncaster district semi-coking).
,, III. is a coal from the Barnsley district (coking).

Gas Analysis.	Coal I.		Coal II.		Coal III.	
	L.T. Gas from Coal.	Gas from Semi-Coke.	L.T. Gas from Coal.	Gas from Semi-Coke.	L.T. Gas from Coal.	Gas from Semi-Coke.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.
$CO_2 + H_2S$ . . .	12·0	7·2	9·4	3·7	5·2	4·5
C_mH_n	3 2	..	0·4	..	2·0	..
O_2	0·6	0·2	0·4	1·3	0·8	0·5
CO	9·4	16·3	8·0	11·3	8·4	15·2
H_2	15·6	48·5	22·5	64·3	26·4	59·8
CH_4	49·6	23 4	55·0	15·0	47 2	16·0
C_2H_6	6·4	..	1·6	..	4·2	..
N_2 + loss . . .	3·2	4·4	2·7	4·5	5 8	4·0
Cal. Val., B.Th.U. per c.ft. . . .	730	436	675	392	675	394
Volume per ton of coal	2000	5500	2200	4000	3300	4800
Distilling temp, ° C.	550	900	550	900	580	900

Table VI. gives the analysis of the mixed gas, as well as the calorific values, &c.

Subsequent experiments were carried out, at the Sensible Heat Distillation demonstration plant, by C. Hamilton Foott, B.Sc., and Dr. G. S. Haslam, in order to test the feasibility of this idea on a scale involving several hundred tons of coal. The

TABLE VI.

Gas Analysis.	Coal I	Coal II.	Coal III.
	P.Ct.	P Ct.	P.Ct.
$CO_2 + H_2S$	8·53	5·78	4·87
C_mH_n	0·82	0·14	0 81
O_2	0 30	0·97	0 62
CO	14·46	10 10	12·46
H_2	39 76	49·30	46·10
CH_4	30·35	29·25	28·70
C_2H_6	1 70	0·57	1·71
N_2 + loss	4 07	3·89	4·73
Calorific Value, B.Th.U. per c.ft.	515	495	507
Total volume of mixed gas, dry coal	8350 c.ft.	7900 c.ft.	8450 c.ft.
Specific gravity, air = 1 . .	0·535	0·440	0·465
Weight per m³, 0° C. 760 mm.	0·6931 kg.	0·5683 kg.	0 6024 kg.
Weight per c.ft.	0·0406 lb.	0·0362 lb.	0·03825 lb.
P.ct. inerts in gas. . . .	12 9	10·64	10 22
Therms per ton of dry coal .	43	39	43
Oil obtained, gallons per ton	21	21	17·5

retort inlet temperature was maintained at 900° to 950° C., and it was found that the oil and the oil production were the same as before—that is to say, the oil range temperature limits were 220° to 230° to 480° to 500° C., and all that happened, as far as the oil was concerned, was that the oil zone was moved further up the retort—*i.e.*, nearer the exit for the gas oil vapour mixture.

The "semi-coke" had a volatile content varying between 2 and 2·8 p.ct. only. The coke was very free burning, and as easily ignitible as with a volatile content of from 8 to 10 p.ct.

The above test results go to prove the writer's statement at the recent Smokeless Fuel Congress at Sheffield, that, provided the distillation products are removed in *uniflow* with the heat flow, the coke structure is not in any way altered so as to lessen the reactivity and combustibility, irrespective of the final temperature of the coke (900° to 950° C.). Furthermore, when distillation takes place in *counterflow*—that is to say, when the coal passing along the retort meets hotter and hotter gases (distilling medium)—the oils, once they are set free at certain temperatures, are never subjected to higher temperatures. Consequently cracking is avoided. Finally, when a large volume of gas is employed as a distilling medium, the distilling conditions correspond to those of a very high vacuum—*i.e.*, greatly lowering the vapour pressure of the oils. This is the main reason why the oils obtained from the coal by the "L & N" process are unlike oil obtained by other processes, but, to all intents and purposes, identical with Pennsylvanian crude oil, topped to the same extent.

The writer has dealt somewhat lengthily with the "new" "L & N" gas, since this is the first time that any information about this gas has been published.

TRANSMISSION.

To go into details regarding the cost of the 20 in. pipeline would occupy too much space, so it will only be mentioned that the steel work was based on £21 per ton finished, and that the cost of the complete line per mile is about £5700, excluding way-leave.

The loss of gas during the transmission has been assessed at 5 p.ct., which should be ample for this comparatively short distance, when employing modern joints, as the "Victaulic," which will allow a high degree of flexibility, and take up expansion efficiently. These two points are very important.

The power cost is taken at 0·2d. per KW., and is assumed delivered from the adjoining electrical station utilizing the coke.

The gas compressing plant dealing with 50 million c.ft. a day will consume 9500 to 10,000 H.P.

The gas storage capacity of the pipeline at a mean pressure of 7 atmospheres Absolute is about 5,500,000 c.ft.

TABLE VII.

—	Cost in Pence per Therm.											
Gas No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Gas cost per therm at plant	3·06	1·95	1·85	1·245	2·87	2·99	2·69	2·28	2·89	1·485	0·7125	3·43
Transmission costs + 5 p.ct. loss inclusive	0·86	..	..	0·7647	0·873	0·911	0·851	0·986	0·9315	0·855	0·7916	..
Total cost per therm in terminal holder	3·92	..	..	2·0097	3·743	3·901	3·541	3·266	3·8215	2·340	1·5041	3·43

The maximum storage at 11 atmospheres Absolute is nearly 9,000,000 c.ft., so that the pipeline itself acts as a magnificent gas storage, and can take up the usual fluctuations from the compressing plant.

Table No. VII. has been worked out on the above assumptions and based on the various combinations and computations from Tables I. to VI.

Gas No. 11 is the new " L & N " gas. Gas No. 12 is the comparative town gas mentioned above, which is produced from coal at 20s. per ton delivered at the gas-works in the town.

CONCLUSIONS.

The costs of the therms delivered into the terminal holder vary less for the different kinds of gas than might be expected, and it is also clear that by *present methods,* however efficient, there is very little hope of effecting any saving by long distance transmission over the cost of producing the gas in a large, well run, modern gas-works situated in a town as such. The possibility of delivering gas to districts *en route,* which would otherwise be without gas or are paying high prices owing to small, inefficiently run plants, must not be lost sight of, as in this manner prices may be obtained for *en route* gas which might alter the whole aspect. Furthermore, it is shown that, to transmit lower B.Th.U. value gas, though the therm is initially produced at lower cost, will not effect any economies at the consumer's end.

It seems, however, a very different matter when a modern low-temperature distillation method is applied properly in connection with a gas scheme, as the credit due to the oils obtained, together with the cheaper operating cost of the distillation plant, effects a very considerable reduction in the initial cost of the therm, provided a quantity of gas is obtained which is not too far below ordinary high-temperature practice ton for ton.

Lastly, a gas scheme of such a nature will work-in excellently with a super electric generation station, and assist the coal trade very materially. This will be clear from the following few figures.

A high-temperature gas plant, delivering 50 million c.ft. of gas daily will require 4000 tons of coal per day.

A low-temperature plant on the " L & N " new lines, in conjunction with an electrical generating plant, would require 6000 tons of coal daily in order to deliver 50 million c.ft. of gas.

The electrical plant, operating on the " semi-coke," would have a size of 500,000 H.P. at a load factor of 55 p.ct. This would meet the case for any super station.

The crude " L & N " oils produced would be 100,000 to 120,000 gallons per day.

Thus we should have a plant which would produce the modern man's requirements of heat, light, power, and oil—incidentally helping the coal trade to the extent of taking 50 p.ct. more coal.

To quote part of Mr. Herring's letter in the " GAS JOURNAL," " They (the gas industry) forget entirely that they are a trading concern and expected to take risks in anticipation of profits. They also forget the action of their forbears who, being men of courage and resource, in the first instance risked their capital in a venture that was by no means, at that time, as certain of success as what to-day lies within the reach of many undertakings."

Has time not repeated itself, and is to-day's gas practice so sublimely perfect that no further improvements can be added? Is it not time that the two greatest public utility undertakings, gas and electricity, combine to serve the general public in the most efficient manner? Can the country go on paying the coal subsidy when it is in the hands of those two undertakings not only to lift the burdens, but to prevent more capital than is strictly necessary leaving this country for procuring the vital oil supplies? And is it realized that at present every new oil-burning ship built in this country puts permanently out of work 150 to 200 miners. If the gas and electricity undertakings grumble at the rates and taxes, they only have themselves to blame.

There is no doubt about it that this country is " up against it," and it requires the combined efforts of gas engineers, electrical engineers, chemists, and physicists to pull together. By united team work, and having an open mind for future developments, the basic industry of this country, the coal industry, will pull through.

Finally, I want to thank my friends and assistants, Dr. Stanley Baker, Mr. C. Hamilton Foot, B.Sc., Dr. G. S. Haslam, and Miss M. Bernhard, for their great assistance, as without their whole-hearted collaboration I could not have completed this article.

LEEDS UNIVERSITY APPEAL.

In response to an inquiry recently made of Professor J. W. Cobb, Livesey Professor at the Leeds University, we learn that the following donations and promises have been received from gas companies and institutions and from manufacturing and contracting firms. A comment on the subject appears in our editorial columns.

	£	s.	d.
South Metropolitan Gas Company	2500	0	0
Gas Light and Coke Company	1000	0	0
Messrs. G. Bray & Co., of Leeds	1000	0	0
Institution of Gas Engineers	525	0	0
Harrogate Gas Company	300	0	0
Scarborough Gas Company	200	0	0
Spenborough District Council Gas Department	200	0	0
Mr. J. Wilfrid Drake (Messrs. Drakes Ltd., Ovenden, Halifax)	105	0	0
Society of British Gas Industries	105	0	0
The British Gas Light Company, Ltd.	100	0	0
Pudsey Gas Company	100	0	0
Wakefield Gas Light Company	100	0	0
Elland-cum-Greetland Gas Company	50	0	0
Coke Oven Managers' Association	26	5	0
Yorkshire Junior Gas Association	21	0	0
Drighlington and District Gas Light Company	5	5	0
	£6337	10	0

A statement as to the financial resources and needs of the Coal Gas and Fuel Department was published in the " JOURNAL " for Oct. 14 last (p. 91); and it was then shown that (1) the fund required to secure adequate accommodation for the Coal Gas and Fuel Industries and Mining Departments is £30,000; (2) the additional income needed to supplement the present endowment of the Department is nearly £3000 a year. Therefore we hope the above list will receive considerable extension.

Gross or Net Values?

In the " JOURNAL " for July 9, 1924, was an account of a meeting of the Institution of Civil Engineers at which, among other things, was discussed the question of whether the gross or net calorific value of a fuel should be adopted in boiler trials. At that meeting the bulk of opinion was in favour of the gross value; no arguments being put forward in support of the net. It seems unnecessary to debit a plant with heat units which cannot be utilized, when there are no insuperable difficulties in avoiding it, and when all that is required is a specification of the net value adopted. In the January issue of " Combustion," Mr. M. Harman Lewis has something to say on the subject. The use of gross values, he says, is likely to lead to erroneous comparisons of results with different fuels, such as anthracite, coke breeze, and coals of good volatile content. He considers the practice of working-out boiler efficiencies on the net value of the fuel is the one which gives the best comparative values for different plants using different fuels. For the sake of argument, suppose fuel A has a gross calorific value of 12,000 B.Th.U., and a net value of 8000 B.Th.U., and fuel B identical gross and net values of 12,000 B.Th.U. Using the gross value, a boiler will have a lower efficiency with A than with B. Is this the fault of the boiler?

Propylene as an Anæsthetic.—Elaborate experiments with propylene are now being conducted, says the " American Gas Journal," to determine its full usefulness as an anæsthetic, for which purpose it has apparently already been found to be valuable. Ethylene, it is pointed out, has been used for years by dentists, and for minor surgical work. Propylene is twice as powerful as ethylene, and is already being successfully used in major operations. Because of its strength, more oxygen can be administered to the patient during its application, and recovery from it is said to be swift. Consciousness returns in approximately one minute after the flow of propylene has been stopped; and in fifteen applications a sensation of nausea was felt by only one patient.

HEAT REQUIRED FOR THE DISTILLATION OF COAL.

Suggested Method for Estimating the Quantity.

[Abstract of an Article by N. E. Rambush in the January Issue of "Fuel in Science and Practice."]

Much has been written about the heat required for distilling fuels. Consideration of most investigations on the subject perhaps leads to the idea that the heat required for distilling a certain coal can only be determined by actual large-scale distillation experiments. Mr. N. E. Rambush, however, believes that, given the general operating conditions, when treating a bituminous coal, the amount of research carried out to date enables an estimate to be made of this heat quantity within a fair degree of accuracy—say, within ± 5 p.ct.—from the results obtained by a carefully-conducted distillation in the laboratory. From the point of view of expense, the advantage of this method is apparent.

Given the rate of heating and the ultimate temperature of distillation required in practice, it would appear that, for the same coal, the quantities of the various products obtainable, and the heat required for their evolution do not differ appreciably whether the fuel is distilled by external heating or by the sensible heat of hot gases. The heat quantity is much more affected by the design of the plant used.

By the dry distillation (*i.e.*, external heating) test in the laboratory, the fuel can be separated into the four main products—gas, water (liquor), tar (and oils), and coke. For a test of this kind it is essential that the quantity of fuel submitted for distillation should be not less than 1 kg., otherwise the analysis becomes too complicated to be carried out by the staff usually employed in a gas-works laboratory. Having previously analyzed the fuel for its moisture and ash content, a simple heat balance can be made which will exclude only the effect of the "internal heat of decomposition" of the fuel substance. This has been the subject of careful tests by many investigators, and there does not appear to be any doubt that for bituminous coals this heat quantity is nearly always exothermic (or, if endothermic, of very small magnitude). The determination of the internal heat of decomposition is, however, very difficult to carry out in a gas-works laboratory; and Mr. Rambush puts forward the suggestion that several typical English coals should be examined in this respect by the Fuel Research Board or by a University specializing in fuel research.

The heat required for distillation of a fuel may be given either as a gross or as a net value, depending on whether the condensible products of decomposition are regarded as vapours or liquids. Mr. Rambush regards the tars, oils, and water as liquids.

The heat supplied to a fuel to decompose it into its final product, coke, can be subdivided as follows: Heat abstracted by moisture; heat abstracted by the non-condensible gas as it leaves the retort or generator; heat abstracted by liquor; sensible heat contained in the fixed carbon; sensible heat contained in the ash; and the internal heat of decomposition.

Heat Abstracted by Moisture.

The moisture in the coal can be defined as the matter driven off by heating the raw fuel to 105° C. in a vacuum. Knowing this amount, the heat quantity involved can be calculated under the following headings: (*a*) Sensible heat of moisture; (*b*) latent heat of the steam made from the moisture; and (*c*) sensible heat of the steam. The specific heat of the moisture in coal is equal to unity; the temperature range for heating the moisture can be taken as from 15° to 100° C.; and the latent heat of evaporation of the moisture can be taken, at 100° C., as 539 calories per kg. The amount of superheat of the vaporized moisture will vary with the temperature of the gases leaving the retort, and, though the specific heat of water varies slightly with its temperature, an average value of 0·5 calorie per kg. can be assumed. The gas outlet temperature varies with the apparatus and distillation process, and may be as high as 500° C., and as low as the dewpoint of the gas—say, 60° C.

Heat Abstracted by Dry Distillation Gas, Tar and Oils, and Liquor.

The composition and volume of the dry gas is easily determined by a laboratory distillation, so that, when the gas outlet temperature from the retort is known, the heat quantity can easily be calculated.

Though the tars and oils are varying and complex, the heat abstracted by them is small (compared with that abstracted by water). To enable the sensible and latent (not potential) heat contained in these compounds to be estimated, the following average values can be assumed: Sensible heat of liquid tar and oils between 15° and 100° C., 0·5 cal. per kg.; latent heat, 75 cal. per kg. (assuming condensation at 100° C.); sensible heat of tar and oil vapours, 0·25 cal. per kg.

The liquor of decomposition, or water of gas formation, varies considerably with the fuel available, and to some extent with its oxygen content. The liquor is not formed immediately the fuel is heated above 100° C. Indeed, water will be found in the condensation products from the fuel when subjected to over 500° C. temperature. In determining the internal reaction heats of fuel, no investigator, remarks Mr. Rambush, seems to have taken the heat contained in the liquor of gas formation into consideration; and yet, between 300° and 600° C., the results generally show that the fuel substance evolves heat, in spite of water being evaporated or formed. It would therefore appear that the formation of the water at the higher temperatures must be accompanied by a far larger heat evolution than is shown by the investigators. Until reliable tests are available, and for practical estimating purposes, it seems reasonable to assume (for bituminous coals) that half the latent heat of the liquor of gas formation requires a heat supply from outside for its evolution, while the other half is supplied by the internal reaction heat of the coal.

Heat Contained in Coke and Ash.

Terres and Schaller, and Schlaepfer and Debrunner, have proved that for practical purposes the fixed carbon substance of distilled coal can be assumed to have the same specific heat as pure graphite; and though the ash contents of various fuels have a differing composition and may considerably affect the reactivity of the fuel, the same investigators have shown that the specific heat of coal ash is almost identical with that of pure quartz.

Internal Heat of Decomposition of Coal.

Hollings and Cobb ("JOURNAL," Vol. 126, p. 917) and Davis, Place, and Edeburn have done exhaustive research on this subject. Summarizing the work of these and other investigators, it may be said that the younger types of fuel evolve considerable heat on carbonization, while some of the older fuels require the supply of very little, if any, heat to complete their carbonization. The total amount of internal heat (whether positive or negative) will alter the maximum temperature to which the fuel is subjected.

Conditions of carbonization—*e.g.*, rate of heating and the gaseous atmosphere—affect the internal heat. Carbon dioxide seems definitely to increase the amount of heat evolved, with a resultant difference in the composition of the distillation gas. Certain constituents of the coal substance are liable to be affected by carbon dioxide. For one coal, the heat evolved at 500° C. was 25 cal. in hydrogen and nitrogen, and about 60 cal. in a carbon dioxide atmosphere. Fuels which yield a good coke evolve less heat than those yielding a soft or non-coherent coke. It appears also that coals giving a gas rich in methane will evolve heat at a range of 600° to 800° C. Below 350° C., nearly all fuels absorb heat for their distillation. Above 800° C., coals generally absorb a little heat. It would probably be representative of average practical conditions for a bituminous gas coal, to assume that no heat will be supplied or abstracted due to the internal reactions. It must not be overlooked, however, that investigators do not seem to have taken into consideration that the water of condensation and the tar necessitate a supply of heat at their moment of evolution.

Example.

Mr. Rambush gives an example of the calculation of the heat requirements for distilling a gas coal by two methods: (*a*) Low-temperature sensible-heat distillation (water gas type) retort generator, with a gas outlet temperature of 100° C., and with coke entering the water gas generator at 700° C. (*b*) High-temperature externally-heated gas retorts, with gas outlet temperature of 400° C., and coking temperature of 1400° C.

The gas coal has the following analysis:

Moisture content	6 p.ct.
Fixed carbon on dry substance	60 p.ct.
Ash content on dry substance	4 p.ct.

Distillation Products per Dry Ton.	At 700° C.	At 1000° C.
Gas, c.ft. (N.T.P.)	8500	13,000
Tar and oils, p.ct.	9	6
Liquor	10	10
Fixed carbon and volatile in coke, p.ct. on dry coal	65	62

Heat Contained in	Cal. per Kg.	
	Method (*a*).	Method (*b*).
Moisture	39·7	49·27
Dry gas	6·93	50·16
Tar	10 57	10·55
Liquor	35·45	50·45
Fixed carbon	153·9	233·0
Ash	6·7	10·0
Internal heat of decomposition assumed to be negligible	Probably exothermic	Probably endothermic
Total heat of distillation per kg. of dry coal	253·2	403·43

A COVERT ATTACK ON THE GAS INDUSTRY.

By NORTON H. HUMPHRYS.

The supply and distribution of cheap and efficient heat and power form a much wider question than the development of electric enterprise, though these are regarded as one and the same thing by certain public authorities. In view of the existing state of national affairs, and the important problems now awaiting the attention of both Houses of Parliament, Ministers of State might be expected to find full occupation in matters more closely allied to immediate responsibilities than in the glorification of a weak industry at the expense of a stronger rival, of which the Government electricity scheme, as recently explained by the Prime Minister at Birmingham, constitutes a remarkable example. Lack of sufficient leisure to admit a complete personal investigation is an excuse for important defects and omissions, for which the responsibility rests to a greater extent on the technical advisers behind the scenes than on the prominent figure under the full glare of the limelight.

Why do successive Governments (so far as they are represented by the Electricity Commissioners) limit attention and anxiety to the supply of electric heat and power? The British Commercial Gas Association could formulate a much stronger case on behalf of gas, on a firm basis of fact, not on vague speculation as to happenings about A.D. 1940. They could show, from Board of Trade returns and other sound evidence, that, far from electricity being the only available, or even the principal, source of distributed heat and power, the established gas industry in the United Kingdom sends out about five times as much of the one, and six times as much of the other. The "Electrical Trades Directory," 1925, p. 388, sets forth the total units generated in the United Kingdom as 6681 millions. The make of town gas over the same period is known to be not far short of 300,000 million c.ft. A Board of Trade unit is accepted as in theory equal to ¾ H.P., of which something substantially less would be actually utilized in practice, and to 3420 B.Th.U., to which a similar qualification may be added. The best makes of gas engine are capable of developing 1 H.P. per 15 c.ft. of gas consumed. The respective duties are therefore in the neighbourhood of:

Electricity . . .	4,500 million H.P.,	or	23 billion B.Th.U.
Gas	20,000 ,, ,,	or	135 ,, ,,

A comparison on the basis of sales would show figures substantially more favourable to gas, as the loss, or "unaccounted-for," is known to be less. The percentage loss of units far exceeds that of therms, and is not likely to be reduced by the addition of a distributing "grid" covering the whole country, and including some thousand miles of cable.

One need not go out of the United Kingdom to find successful enterprise in the direction of distance distribution as applied to gas; but in the United States, runs of 200 miles are giving satisfaction to-day. There is no excuse for ignorance as to cost and other particulars; and if distribution of electricity offers special advantages, why is the gas so distributed not used to generate electricity at the source? So long as 99·75 p.ct. pure copper is required for conductors, and high-pressure currents with step-down transformers are an essential feature, gas as supplied through wrought-iron pipes with welded joints at high pressures has nothing to fear on the score of "cheap" electrical distribution. There is no loss on reduction of pressure, equivalent to that of the step-down transformer.

Gas is in no sense a sheltered industry. Any privileges enjoyed under Parliamentary protection are amply paid for in the shape of profit, price, and quality obligations. And those who advocate preference for British goods have not appreciated the extent to which the supply of gas is not only a home, but also a local, industry. Provided that coal can be obtained at a fair price, it has no hankering after foreign petroleum. It employs an exceptionally large proportion of local labour both skilled and unskilled. Some 10 to 15 p.ct. of the total receipts figure as "wages" in the audited revenue account; and in addition a large proportion of the expenditure for coal, pipes, appliances, &c., represents wages paid at mines or construction establishments. There is every reason for resenting the silence of contempt, and for expecting a degree of consideration on the part of the Government equal to that extended to other branches of industry.

The reasons that have led to the extraordinary spectacle of all political parties uniting in favour of a scheme that carries with it the germs of Nationalism, Collectivism, and Syndicalism are not far to seek, and are unfortunate at a time when a desperate fight for the nationalism of the coal industry is in progress. The backbone of the scheme is State control and guarantee, which is not a wide step from State ownership. On the one side are pressing complaints of excessive taxation and the resulting effects on trade and employment; on the other, an enormous and increasing load of expenditure. The difficulties are illustrated by a proposed raid on the Road Fund—which was raised for prompt expenditure, and in no sense as a Government loan—and other frantic endeavours to find the materials for constructing an economy budget on a foundation of extravagant expenditure. The Cabinet does not care to face the music by official recognition of fundamental causes that are evident to any one who can read and think, but prefers a wild and spectacular scheme which, if it does nothing else, will serve to divert and occupy public attention for a time. Hence the preference for romantic excursion into the unknown, rather than a competent and complete examination of existing circumstances. Flights of fancy are more popular, and attract a greater degree of public attention, than prosaic statements of fact.

Consequently the gas industry is exposed to an attack on different lines, but with the same object in view, as it experienced some fifty years ago, when the Edison lamp was uproariously hailed as an invention that would reduce gas-works to a scrap heap within about four years. Not only was an early disappearance of the gas industry confidently predicted, but, without regard to the futility of flogging a dying horse, everything that could be suggested by disingenuous misrepresentation, exaggeration, and active imagination was pressed into service, going far beyond mere economical considerations, to include longer life, half the existing painters and decorators thrown out of employ, and an advance in general well-being and prosperity, similar to that indistinctly foreshadowed in the present Government scheme. A comparison of the facts of 1926 with the prophecies of 1876 will strengthen a preference for fact rather than fancy. Possibly rendered wiser by experience, the advocates of electricity replaced their former virulence by a silence that implies contempt; but the object is the same. Again we meet with stout assertions that gas is on its last legs. The Daily Press, ever on the lookout for a good selling headline, open their columns freely to any new sensation, true or otherwise. Again, we find simple or timid shareholders induced to part with their property at panic prices—which reminds one of many instances of privation thus caused in 1876 to holders, septuagenarians of both sexes, and others incapable of remunerative labour, whose gas dividend constituted a major portion of a bread-and-a-cheese income.

Though heat and power are the chief attractions, the possibility of cheaper artificial light is thrown in as a makeweight, regardless of the fact that the inverted incandescent gas burner and the gasfilled or metallic-filament bulb have already so far reduced the cost that a very small margin remains for further economy. Artificial light is used in increasing quantity, but no complaint of its costliness and consequent prejudicial effects on trade or manufacture has been formulated. Except for those concerns in cities of the first magnitude crowded with underground stations, basement workshops, offices, restaurants, warehouses, &c., neither gas nor electricity can earn a dividend on lighting business only, and therefore both have sought to encourage other lines. Gas has made concessions in the form of discounts or differential prices for gas used for purposes other than lighting, but not to anything like the extent that has been found necessary by electricians.

The explanations of the fact that, far from exterminating gas, electricity has failed to hinder its development and progress, are to be found in the defects inherent in electricity, some of which may be lessened by the Government scheme, while others will be accentuated. The large capital outlay necessitates a heavy loading on selling price, if a reasonable profit is to be earned, which serves to put the generating costs in a very subordinate position. If electricity was provided gratis, only a modest reduction on the selling price, insufficient to increase demand to any great extent, would be possible. There are no means of efficient storage in quantity. The distribution charges are high. There are no saleable residuals. Both heat and power values are small. Notwithstanding the parrot-cry about "electricity for everybody and everything," the summer consumption is poor, and the idle time therefore excessive. (See "JOURNAL" for Dec. 17, 1925, p. 718.)

Until substantial improvement can be effected in these matters, "electricity for everybody" is not more substantial than a will-o'-th'-wisp. The South-West of England is dotted with factory ruins, evidence of lucrative trades in former times, now rendered useless by competition from rivals more favourably situated in respect to transport costs, supply of staple materials, coal, &c. Granting that electricity from some distant centre of supply is on tap all over the district, where are the financiers who, in the face of these disadvantages, will be willing to provide constructional and working capital, suitable housing, and other inducements sufficient to attract a working population away from the delights of town life? These and many other requirements must be met before a demand for electricity sufficient to create remunerative business can be realized.

Erratum, Reports of Gas Associations, 1925.—We regret that on p. 70, in the list of new members of the Southern Association, Mr. H. C. Ratcliffe is shown as Assistant Engineer and Chemist of the *Romsey* Gas Company. Mr. Ratcliffe is of the *Hornsey* Gas Company.

JOINT MEETING OF MANCHESTER AND YORKSHIRE JUNIORS.

Visit to the Works of Messrs. Parkinson and Cowan (Gas Meters) Ltd., at Stretford.

[Following an inspection of the Works there was a paper by Mr. R. W. Malone, of Bury, on "Distribution Topics." In this the author states that the success of any business depends to a large extent on the satisfaction of its customers, and that, to ensure this satisfaction among their consumers, gas undertakings should have some form of maintenance. He is of opinion that the expense of any such scheme is doubly repaid.]

On Wednesday, Feb. 3, the Manchester and District Junior Gas Association and the Yorkshire Junior Gas Association visited the Victory Works, where they were welcomed by Mr. Franklin Thorp.

DESCRIPTION OF WORKS.

Victory Works, the latest addition to the 22 factories of Messrs. Parkinson and Cowan (Gas Meters), Ltd., and their subsidiaries, though of recent acqusition, and as yet only partially developed, already employs over 400 workpeople.

The main shop is a one-storied building with a floor area of 60,000 sq. ft. Artificial lighting is by small high-pressure gas lamps, for spot lighting, and by large low-pressure gas lamps, which afford general illumination. An engineers' shop complete with travelling crane has lately been added to the main shop, and a brass foundry has just been erected on the land available for extensions.

Gas is used for many purposes. Mixed gas and air under pressure is used for lighting. High-pressure gas is used for tinmen's stoves and for the melting of tin and antimony, and low-pressure gas and high-pressure air for brass and copper melting. Thermostats are used to control the temperature of the metal pots, to prevent deterioration. The consumption of gas—which, by the way, is supplied by the Stretford Gas Board—is about 1,000,000 c.ft. per month, and is rapidly increasing.

The first thing which attracts attention in the main workshop is the ideal conditions under which the employees work. Perfect lighting, ample air space, good ventilation, and orderly arrangement of machines, benches, and stores are factors which lead to the good quality of the firm's products.

The works are divided into sections; each section being self-contained and complete with foreman's office. The Works Manager's office is raised about 6 ft. from the shop floor level, and commands a view of the whole works.

To enable visitors to inspect the principal operations of meter making, &c., thoroughly, they were taken in small groups by various members of the staff; Mr. Eric Cowan, B.A., conducting the first party. The manufacture of the component parts from the raw material to the finished product was shown. With regard to the tinned-iron wet meter, the casing was seen from the black iron sheet, through the cutting, stamping, rolling, and tinning processes, to the complete meter. A notable feature of the Cowan tin "Duplex" wet meter is that the iron is tinned after all the stamping and bending is complete. The manufacture of drums was inspected from the ingot tin, through the melting (by gas), casting, rolling, stamping, assembling, and soldering, to the finished article. The brass work was examined from the ingot brass, through the moulding, casting, machining, and lacquering stages, to the complete part; while the assembling, testing, and painting of meters were also witnessed.

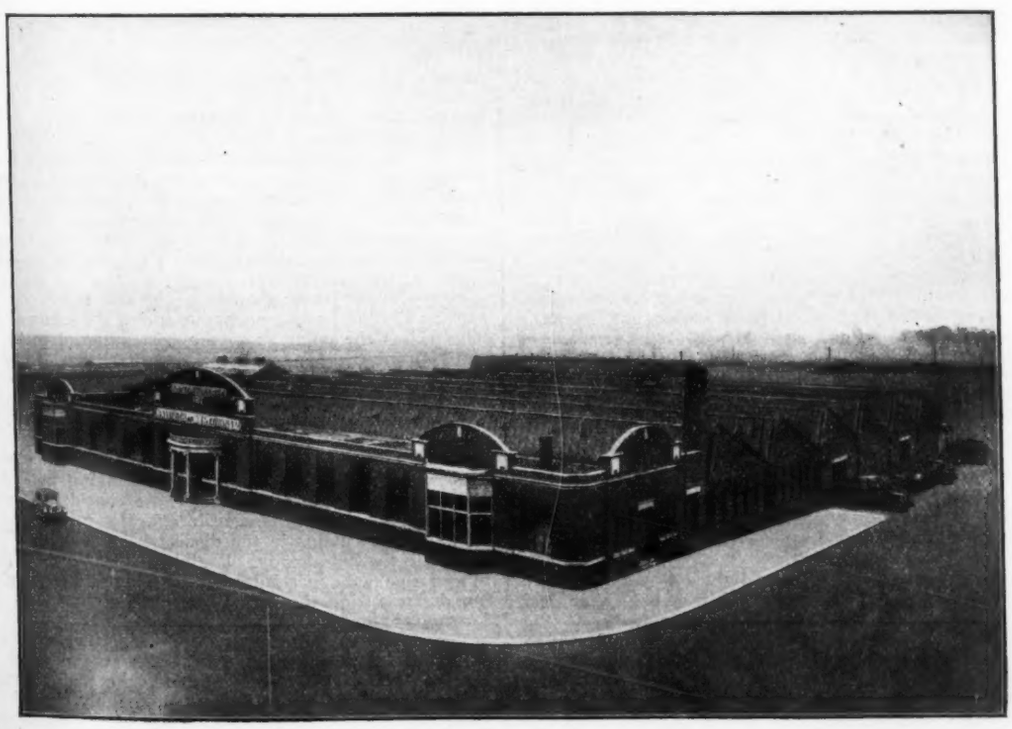
The visitors also scrutinized corresponding details of the manufacture of tin dry meters, the careful testing of the leather diaphragms by strong light in a dark room, the casting of the valves and gratings, the tying of diaphragms, and the testing for tightness.

The firm make on their own premises all the parts of their meters. Having their own leather factory, brass and iron foundries, tin and white metal melting furnaces, enamelling works, and rolling mill, they are in the position of being able to guarantee the correct composition and manufacture of all component parts. Most of the brasswork is produced on automatic and capstan lathes, though for some of the hard brass shafts, worms, &c., hand lathes with special attachment are used.

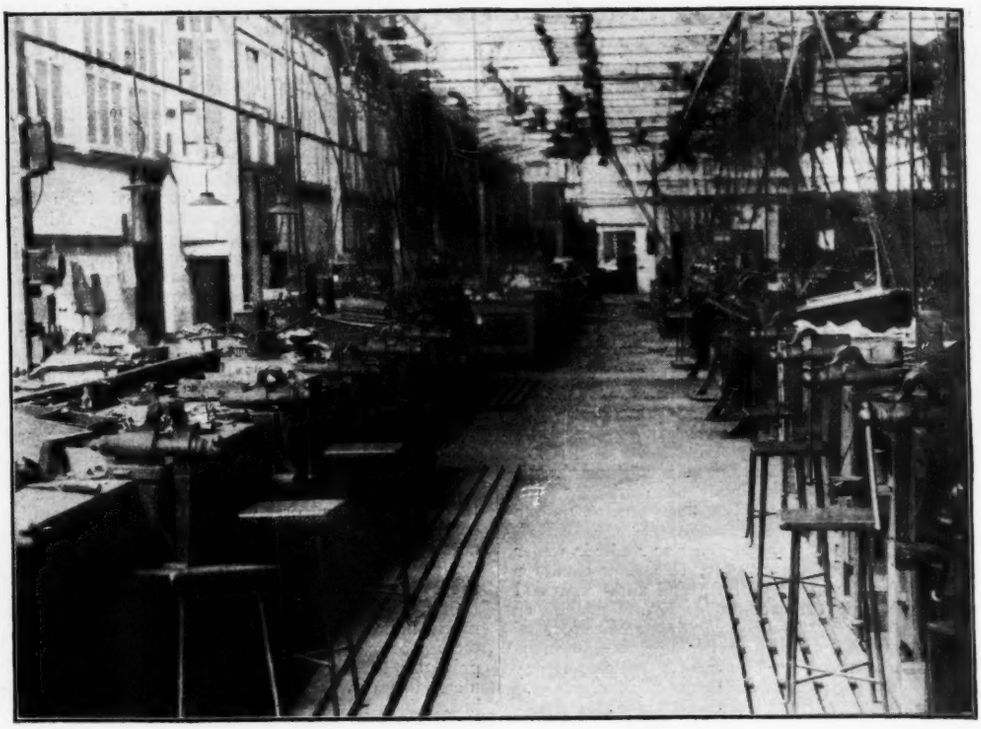
Stamping and drawing in power presses was watched with much interest, while the beautifully accurate work of press tools produced in the tool room was greatly admired by those present. In the blacksmiths' shop the iron parts for station meter drums were being produced, and an annealing furnace heated by gas was at work.

Working models of various types of meters were on view, special interest being shown in the patent "Duplex" meter in many forms—*e.g.*, with spoon compensator, Crowther float (Liverpool pattern), Esson compensator (Sheffield pattern), and prepayment attachment having external valve box and valve removable *in situ*. A new dry prepayment meter was another centre of attraction. This has many important features, such as deep-rimmed diaphragms with large rounded edges, to prevent cutting leathers, and an attachment which is detachable and convertible *in situ* to take 1d. or 1s., while the stop valve box is large and the stop valve removable without unsoldering.

Interest was exhibited in the up-to-date arrangement of the store and packing department. In the engineers' shop the firm had arranged for the testing of a rotary meter at all rates of flow, from 4500 to 45,000 c.ft. per hour. The test was carried out by means of a large calibrated holder, which was claimed to be the largest testing plant of its kind in the country. By means of this holder, station meters of all kinds can be tested



THE VICTORY WORKS OF MESSRS. PARKINSON & COWAN.



GENERAL VIEW OF BRASS SHOP AND INDEX DEPARTMENT.

at their badged rates of flow up to 250,000 c.ft. per hour. Governors, of both station and retort house types, were on view as working models, while a new arrangement for regulating pressures from a distance was seen at work. Another interesting governor was one worked by a definite head of water, which gives great power to move the valve, and so prevents troubles from dirty gases. There was also seen an old 9000 c.ft. rectangular station meter in course of conversion to one with a capacity of 14,000 c.ft.; this being possible by installing a "Duplex" drum and a special inlet spout. This should be a boon to works requiring larger capacities of station meters without incurring the expense of building new houses for larger ones. The new brass foundry, which completed will require some 6000 c.ft. of gas per hour for melting purposes, was also inspected.

The works are equipped with kitchen and mess rooms. A Welfare Committee, elected by the workpeople, runs the dining and refreshment departments; while the firm provide the cooking apparatus, gas, and assistance. A nurse is always in attendance; and the welfare of the workpeople generally is well cared for.

After the inspection of the works, tea was served in the large dining hall. The chair was taken by Mr. Franklin Thorp, who was supported by Mr. J. T. Haynes (President of the Manchester Juniors), Mr. R. N. Webb (President of the Yorkshire Juniors), Dr. E. W. Smith (London), Mr. F. H. Robinson (President of the Manchester District Institution of Gas Engineers), and several Vice-Presidents of the Manchester Junior Association.

Mr. HAYNES said he had to thank Messrs. Parkinson & Cowan for their kindly reception of them, for the very interesting and instructive visit round their works, and for their generous hospitality. He welcomed Mr. F. H. Robinson, of Harrogate, and remarked that they had that afternoon the largest turnout, either as a single Association or as a joint meeting, that they had ever had. They had enjoyed the visit more particularly as Mr. Thorp was one of their Past-Presidents. He extended a hearty welcome to the members of the Yorkshire Association.

Mr. WEBB moved a vote of thanks to the firm, and Messrs. Eric Cowan, Albert Whatmore, Blair, Lewis, and Malcolm, who had helped materially in making the visit so successful.

Mr. T. H. WILLIAMS (Crewe) seconded this, and Mr. S. T. S. MUSGROVE (Sheffield) supported it.

Mr. THORP, in reply, said he was delighted to meet so many of them, and particularly to meet old friends. They had seen meters made that day from the raw material to the finished article. He claimed that they were the only firm who made both wet and dry meters complete from start to finish, and mentioned that the rejects were under 2 p.ct. He also claimed that they were the largest firm in the gas industry, as far as meter makers were concerned. He expressed his own appreciation of the Chairman of the Company.

Mr. WHATMORE (Works Manager) added a few words.

Mr. A. L. HOLTON (Manchester), Mr. D. V. HOLLINGWORTH (Birchenwood Collieries), Mr. C. E. TEASDALE (Salford), Mr. S. CARTER (Liverpool), and Mr. W. BUCKLEY (Manchester) all added a few remarks as Past-Presidents.

After tea, the following paper was read.

DISTRIBUTION TOPICS.

By R. W. MALONE, of Bury.

MAINS.

These constitute one of the great sources of trouble to the distribution department, as during the last few years the subsoil around them has been continually disturbed either by the Post Office laying telegraph cables, or by the electricity departments their main cables and services. My experience of their method of laying has indicated that if there is a gas main in the vicinity, the ducts and cables are fixed as near as possible. In fact, in one of our districts, to give an instance, an electric cable laid within the last few months was run exactly on the top of a 6-in. main. This is by no means an isolated case. It is a matter which I certainly think ought to be taken up by all gas companies, if not for their own benefit, for the safety of the public. On several occasions when escapes have been reported, we have found on locating them that, through a fault in the electric service, the gas mains have been fused. There is also great danger in these methods to the employees of the department, when trying to locate an escape by barring or spiking—to say nothing of the extra work entailed in repairing a break. In many cases it is impossible to clear the main without first removing the obstructions.

Heavy motor traffic should also be taken into consideration, as the vibration has a tendency to spring the joints of the pipes. This raises the point as to the best material to be used for caulking joints. My own experience has been of iron borings, lead wool, and run with lead; and in my opinion the joint run will lead, and caulked, is the most satisfactory, though lead wool must be given credit for being easier to handle in many cases.

In the villages and outlying parts of the districts many new houses, building schemes, &c., are springing up. In nearly all cases these require gas, and cause considerable anxiety to the distribution superintendent in affording an adequate supply. Owing to the mains in the district being old, they are taxed almost to the full already. I think that gas undertakings have missed a golden opportunity for enlarging and relaying the leading mains during the period when the streets were disturbed for the laying of electric and telegraph cables.

The system of main inspection on which we work is to take a district street by street, open out in several places, and fix pressure gauges. If found at fault, the main is cut out at distances of about 30 yards, and thoroughly cleaned out by a special wire brush drawn through by rods. The success of the method to a great extent depends on the construction of the brush, which is about 8 in. long and of suitable diameter to

PART OF STAMP SHOP.

fit the main being cleaned. The wire is sufficiently strong to retain the position without losing its flexibility, springing from a wire core of about $\frac{3}{8}$ in diameter. The bristles are cut out or grooved at distances of 2 in., to allow them to bend, and also to form a space in which the dirt and rust are carried out. As an example, I recently tested 750 yards of 4-in. main in a district where the level falls about 100 ft. over that distance, and found that, though the pressure shown at the beginning of the main was $3\frac{1}{2}$ in., that shown at the bottom was only $\frac{1}{2}$ in. After cleaning out in the manner described, I was able to give a pressure of $2\frac{1}{2}$ in. at the bottom. Though I stopped the main with bladders, and allowed about 30 gallons of water to flush the main, only 5 gallons came away at the end of the 200 yards; the remainder having been absorbed by the rust and dirt in the pipe.

Immediate attention to the location and repairing of broken mains is a matter of importance. I have found of great assistance an emergency stand, which consists of a platform at the end of the workshop, on which is placed a pair of every size of clip, complete with all packing and necessary material for immediate fixing. All tools, inspection and trench lighting lamps, gas masks, and rescue harness and oxygen set, are arranged ready for taking on to the job.

SERVICES.

The Bury Gas Department are responsible for the supplying and fixing of all services from the main to the meter. A private service is allowed only on condition that a meter house is provided on the boundary of the premises, at the nearest point to the existing main. This assists us to a great extent, as we are able to examine, replace, or enlarge any service at our own discretion, without having to obtain the permission, or take any notice of objections, of the consumer.

We have a gang of men continually inspecting services and relaying all that are found corroded or in any way faulty. With galvanized iron steam tube, we find that, while some of the services which appear to be good on the outside are full of corrosion and rusted through from the inside, others have corroded and rusted away from the outside, and constitute serious factors in the amount of leakage.

All wrought-iron tubes used by our department for laying services in the ground are of galvanized steam quality, and all fittings, brass meter cocks, &c., are of full bore, and of the best quality obtainable. In my opinion, if cheaper articles are used for this work, they are far more costly in the end. In cutting and screwing the tubes, special care is taken to see that all the burrs are filed-down, and the tube opened out to its full size before screwing into the fitting. If this is not done, especially where cutters are used, the bore is reduced considerably, and also a ridge left which will collect any rust or residue, and eventually block the service.

METERS.

During the last five years we have taken out and tested the whole of the meters in the district, replacing any found faulty, and exchanging all that were too small. Throughout this work we experienced difficulty, owing to the meter boxes being too small to hold the ordinary size of meter giving the capacity required. A large number were 2 and 3 light, with a measuring capacity of 12 or 18 c.ft. per hour, which at the time of installation were capable of supplying the few lights then fixed on the premises, but were not able to deal with the increased amount of gas required at the present time, when we find that nine out of every ten houses have cookers and boilers installed.

To overcome this, we have in many cases been compelled to fix small-cased meters, such as No. 1 and No. 2 standard, with a large capacity, from which I am inclined to think we do not get the same satisfactory results that could be attained if the full-sized meters had been installed. The following tests which I have recently taken of the different sizes of meters, each supplying a cooker and boiler, seem to substantiate my theory:

Test of No. 1 Meter.

Pressure on Holder. Tenths.	Pressure on Burners. Tenths.	Description of Burner.	Consumption per Hour. C.Ft.
20	19	No. 1—4 in.	16
,,	20	No. 2—2 in.	6
,,	20	No. 3—3 in.	12
,,	18	No. 4—Griller	18
,,	18	Oven	20
,,	18	Boiler	30
,,	10	All on	80

Test of Small Cased Large-Capacity Meter, 60 C.Ft. per Hour.

Pressure on Holder. Tenths.	Pressure on Burners. Tenths.	Description of Burner.	Consumption per Hour. C.Ft.
20	19	No. 1—4 in.	16
,,	20	No. 2—2 in.	6
,,	20	No. 3—3 in.	12
,,	19	No. 4—Griller	18
,,	19	Oven	20
,,	18	Boiler	30
,,	12	All on	80

Test of 10-Light Meter.

Pressure on Holder. Tenths.	Pressure on Burners. Tenths.	Description of Burner.	Consumption per Hour. C.Ft.
20	20	No. 1—4 in.	20
,,	20	No. 2—2 in.	8
,,	20	No. 3—3 in.	18
,,	20	No. 4—Griller	22
,,	20	Oven	24
,,	19	Boiler	32
,,	15	All on	84

In future we shall be able to fix the required size of meter in any of the recently built houses, as we have stated in our rules to gasfitters that the meter box or case must on no account be less than 2 ft. high by 1 ft. 8 in. wide by 12 in. deep. In fixing the new appliances, it is often found that the piping installed is too small to give the amount of gas required, and a larger pipe has to be run direct from the meter. Many appliances are not fixed because of this defect, as the consumer objects to having the house upset or the decorations disfigured. In our rules to fitters, we have again guarded ourselves in new property, as we only lay-on the service, and supply gas, on the condition that the leading main from the meter to the back kitchen is not less than ¾-in. bore (internal diameter) lead or composition pipe, and is carried from the front to the back of the house, and down to the skirting board near the floor.

MAINTENANCE.

This is one of the greatest assets of the distribution superintendent, if the work is in the hands of capable men who have been specially trained. From their reports, it is possible to keep in touch with every point, down to the trifling details which are often overlooked while attending to larger matters. We start with boys who have just left school. After being for a period in the workshop, to get an insight into the working of the department, these boys are sent out with main and service layers, plumbers, meter inspectors, and maintenance inspectors, until they have a thorough knowledge of everyday complaints. During the winter months there are classes for instruction in the various branches, and periodical examinations are held.

For the maintenance scheme, the town is divided into four sections. Two men are appointed to work in each district, and are provided with one hand van and two bags containing an efficient set of tools for the work. The van is stocked with pendants, burners, mantles, &c., and a selection of small fittings necessary for any repairs which may be required. Advertisements of gas appliances are painted on the ends and sides.

The men set out from the department each morning, and are responsible for all complaints, which are entered in a book for that purpose. They call from house to house, to see that all gas appliances are in order. If anything is found defective, they will make the fault right, overhaul and clean burners, &c. Any new material or fittings are taken from the van, and charged to the consumer—a receipt for same being given from a book which every man carries.

Cookers, boilers, fires, &c., which cannot be rectified in the house are reported to the stove cleaning department, and are brought away and overhauled and cleaned in the workshop, fitted with all new parts, burners, tins, &c., and returned the same day, for which a sum of 10s. is charged to the consumer. Any bad services or faulty mains are immediately reported for the attention of the main and service department.

The success of all business depends to a great extent on the satisfaction which is given to its customers; and I certainly think that the introduction of maintenance schemes has been one of the factors which has enabled gas to hold its own against the increasing competition of electricity. Maintenance schemes are a source of benefit to gas concerns, and educate the consumer in the use of gas and all appliances; and in my opinion the expense of any scheme is doubly repaid.

The use of gas for power and manufacturing purposes is a source of revenue which to some extent has been overlooked in the past. During the last three years we have installed a number of new and reconditioned engines which have given every satisfaction. We have guaranteed them for twelve months against breakage, and have maintained them for that period, visiting every three months to see that they are running satisfactorily. We then continue with the maintenance at the following scale of charges:

Up to 10 H.P.	£4 per annum
Over 10 H.P. and up to 40 H.P.	£8 ,, ,,

We have found that this scheme gives every satisfaction, and saves a great deal of unnecessary labour and expense.

Mr. PYKETT (Lancaster) moved, and Mr. BYROM (Stalybridge) seconded, a vote of thanks to the author.

Messrs. THORP, PYKETT, and HASLAM joined in the discussion, which was brief—time being limited.

This brought to a close a successful meeting.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

The Association visited the works of the Kyle Chemical Company, Ltd., on Saturday, Jan. 30, when they were received by Mr. MONTGOMERY, the General Manager.

DESCRIPTION OF WORKS.

The works are situated on the Firth of Clyde. They were originally designed to manufacture sulphuric acid from Australian concentrates or blende. When the erection was completed in January, 1920, concentrates were not available, and the Company had to use spent oxide. However, plentiful supplies of concentrates are now available, and regular shipments are arriving direct at Irvine and the near-by seaport of Ardrossan.

There are two units which work entirely separately. Each unit consists of two Delplace furnaces of fifteen compartments each, two Glover towers (one spare), four chambers, and two Gay Lussac towers. The total output of sulphuric acid for the two units is approximately 30,000 tons per annum. At present there is one unit on spent oxide, and another on Australian concentrates; and the plant generally is giving complete satisfaction.

NO. 1 UNIT.

On No. 1 unit, where spent oxide is roasted, the raw material (of which there are large stocks) is raised into overhead storage hoppers which are well above the level of the charging hopper of the furnaces. The oxide is dropped into charging bogies divided into four divisions, each division holding a charge. On the way to the furnace, the charge is weighed on a platform machine. There are bottom doors on each division, which are open when the bogie is over a furnace charging hopper; and the weighed charge is dropped in. The furnaceman on the lower level pulls a chain which opens a bell and allows the charge to drop into the top shelf of the Delplace furnace. There are six shelves in each compartment, but in roasting spent oxide only three are necessary.

The gases pass from the furnace through dust flues, and thence through nitre ovens on the way to the Glover tower, and through four chambers of ample capacity. On leaving the fourth chamber, the gases enter the first Gay Lussac tower, whence they are drawn by a Kestner fan and discharged into the bottom of the second Gay Lussac tower, on the top of which is the exit to the atmosphere. The acid is handled entirely by Kestner elevators, ten of which have been in steady use for six years, working under an air pressure of 100 lbs. per sq. in.

NO. 2 UNIT.

On No. 2 unit, where Australian concentrates are roasted, there are similar arrangements for storing and handling the material as on No. 1, but in the furnace the whole six shelves are used in each compartment, and additional heat is required to ensure a sweet roast, or, in other words, complete desulphurization.

The power plant is neatly grouped in one house, and consists of two Alley & Maclellan air compressors, two Worthington pumps for water sprays, four centrifugal pumps for circulating acid cooling water, a Tangye engine for the workshop, and a lighting switchboard. Two Lancashire boilers generate steam at 150 lbs. pressure, which is reduced on entering the power house to 100 lbs. per sq. in. Feed pumps, feed heaters, and economizers are installed with the boiler plant.

After the inspection, the party were entertained at tea by the firm—Mr. THOMAS RAMSAY, Director, presiding.

Mr. RAMSAY said his co-Directors were delighted to receive a visit from the Association. The commercial value of the gas industry's bye-products was not sufficiently understood. To-day America was willing to take all the creosote oil she could get, and she looked to the gas and coke industries of Great Britain for her supplies. It was often said that exports should balance imports, otherwise the nation would suffer. In this connection it should be remembered that the gas industry exported from four to five millions every year, thereby greatly aiding the country.

Mr. ROBERT GRAY, President of the Association, thanked Mr. Ramsay and the firm for allowing the Association to inspect the Kyle Works. They realized how important it was to keep in touch with concerns allied to their own particular work. What they had seen would be helpful to all present, as sulphuric acid was used extensively in gas-works practice.

Mr. D. FULTON (Helensburgh) proposed the toast of "The Kyle Chemical Company, Ltd." The firm, he said, were comparatively young, but they were progressive, and had given the local gas undertakings a new outlet for their spent oxide. Previously most of this went over the border, but now they were saved the heavy carriage, and benefited in price and—what was more—quality. He assured Mr. Ramsay that all spoke highly of the Company.

Mr. RAMSAY, in reply, explained that during the war years Mr. Hughes, the Australian ex-Premier, who was in this country, convinced the Government that the zinc concentrates which previously were sent from Australia to Germany and Austria should be sent to Great Britain. The Government then suggested the erection of acid plants near to spelter works, to deal with these concentrates; and subsequently the Kyle plant was erected at Irvine. The situation could be much better, as railway facilities were not of the best. The works cost about £250,000, and were laid down in 1917. A great deal of the success of the Company was due to Mr. Montgomery, their General Manager, and Mr. Robertson, the Secretary. With regard to the price of acid, with the present high cost of freights there was no immediate prospect of reduction. He assured those present that his Company would always endeavour to serve the gas industry well.

COKE COMPETITION PAPERS

Which obtained the Ten-Pound Awards in Section III.

(*Concluded from p.* 291.)

SALE AND UTILIZATION OF COKE.

By "VERA PRO GRATIIS."

[Dr. W. B. DAVIDSON, Warkworth House, Tynemouth.]

Before a salesman can command the respect and confidence of his customers, he must know as much as possible about the article he is wishing to sell, and be able to advise regarding its proper utilization, or render assistance when difficulties arise in heating problems. A comparative knowledge of coke's competitors—coal, oil, gas, and electricity—is also necessary before the coke salesman can make the best of the markets already open, or find new fields for business.

As a rule, the coke salesman is not a technical man. He picks up his knowledge as he goes along, and is not conversant with calorific value, thermal efficiencies, volatile, ash, and moisture contents, or any properties of coke that matter, other than size, hardness, and general appearance. He and his assistants, one sometimes finds, do not even burn coke in their own homes, and are not experienced in the kindling and burning of different sizes and kinds of coke. He is thus unable to speak enthusiastically of the suitability of coke for the house or of the economy resulting from its use.

The average gas engineer who is not also general manager concerns himself very little with the quality and sale of the coke until its handling and storage become expensive and troublesome. Then he is more concerned with getting rid of it, and having comfortable room again, than with customers clamouring for coke which admirably suits their needs. Coke, like tar and ammonia, is looked upon as a troublesome bye-product. Many small works have no coke screening plant of any kind, and fairly large works are often found to possess incomplete and unsatisfactory grading facilities.

If gas coal is usually judged solely by its gas yield and price, the coke is not likely to be carefully tested and examined as to its general suitability.

This is not as it should be. If advantage is to be taken of the extensive opportunities of selling coke in competition with coal, gas engineers and managers must make a strong and persistent effort to raise the quality of the coke made, and standardize the same as far as possible.

This will not be an easy matter on large works where train loads or ship cargoes of one kind of coal come in at a time, and are forthwith delivered at the retort house, because coals differ in the density and hardness of the coke they form; but such differences are subsidiary or negligible in comparison with possible variations in the ash and moisture content. There should be no great difficulty in standardizing the amount of ash in the coal received, if the buying, sampling, and testing of coals receive the attention they deserve, and if organized pressure is brought to bear on Colliery Owners with the object of maintaining the supply of clean coal as low in ash as it is reasonably possible to get it.

As regards the screening and grading of coke, this should be done as a matter of business; the engineer and salesman working in collaboration to provide the size of coke demanded. In this matter there should be some intelligent anticipation, if new outlets for coke are to be found.

In an industrial centre, the following grades of coke will be found necessary to fulfil various requirements:

1. Large coke, above 1¾ in. (rejected by 1¾ in. screen).
2. Broken, or domestic, coke, through 1¾ in., over ¾ in. screen.
3. Smithy coke, forge coke, or coke nuts, through ¾ in. over ⅜ in. screen.
4. Coke dust, sometimes called coke breeze, through ⅜ in. screen.
5. Washed coke nuts, through ¾ in., over ⅜ in. screen.
6. "Sinkers" obtained from (5).

No. 1 size is in demand for general purposes for large furnaces, slow combustion stoves, central heating, bakers' ovens, metallurgical works, &c.

No. 2 is the best comprehensive size for the domestic grate, open or closed, for domestic hot water supply boilers, for small slow combustion stoves, and the like.

The London Coke Committee set the size of domestic coke at ¾ in. to 2 in., but I am of opinion that the coke from 1¾ in. to 2 in. is too large. The best size is really 1 in. to 1½ in.; but as this would too greatly restrict the quantity of domestic coke available, and throw too much on other markets, we must perforce adopt wider limits.

No. 3 size is in special demand for smiths' forges, enclosed stoves, in kitchen ranges where the draught is good, and in boiler furnaces, whether hand-fired or mechanically stoked, and also in the smaller hot water supply boilers.

No. 4, the coke dust, finds little or no sale at a price corresponding with its calorific value, which on the dry basis is generally over 12,000 B.Th.U. per lb. By far the best use to be found for it is for raising steam on the gas-works: This can be done either with Lancashire or water-tube boilers fitted with suitable furnaces permitting a deep layer of fuel, and using forced draught. Where there is no special coke-breaking or cutting carried on, the works boilers ought to be able to use all the coke dust made, and thus effect economy.

When for any reason, such as coke breaking, the dust is larger in amount than the boilers can deal with—and this may also happen when waste heat boilers are fully used—recourse must be had to other uses, rather than send it to the tip. Such uses might be: Mixing with coal for external gas producers, raising steam for water gas manufacture or for complete gasification plants, briquetting with admixture of coal and carbonizing (proportions required being about 2½ of coal to 1 of coke dust). Another new field for coke dust is as powdered fuel. When it is employed in boiler furnaces, care must be taken that the flues, especially the main flue, are ample in size, and that provision is made for trapping dust which tends to get blown up the chimney stack. For this purpose, a large chamber following the main flue is desirable. This should contain vertical baffle plates arranged to give the flue gases a zig-zag up-and-down course. The chamber can conveniently possess a water lute from which the dust and grit which fall into the water can be removed by rakes when it becomes necessary. No steel or iron should be employed in the construction of the water tank, as the water becomes acid by absorption of sulphur dioxide from the flue gases.

The most promising demand and the greatest field for development in the future will be domestic coke to replace the 35,000,000 tons of raw coal annually consumed; and, as this will undoubtedly necessitate breaking, the coke dust problem is likely to become acute. In my opinion, steam raising in the first place, and, for the surplus, mixing with strongly caking coal and re-carbonizing the mixture, either in the form of briquettes or in the usual way, will provide the best solution.

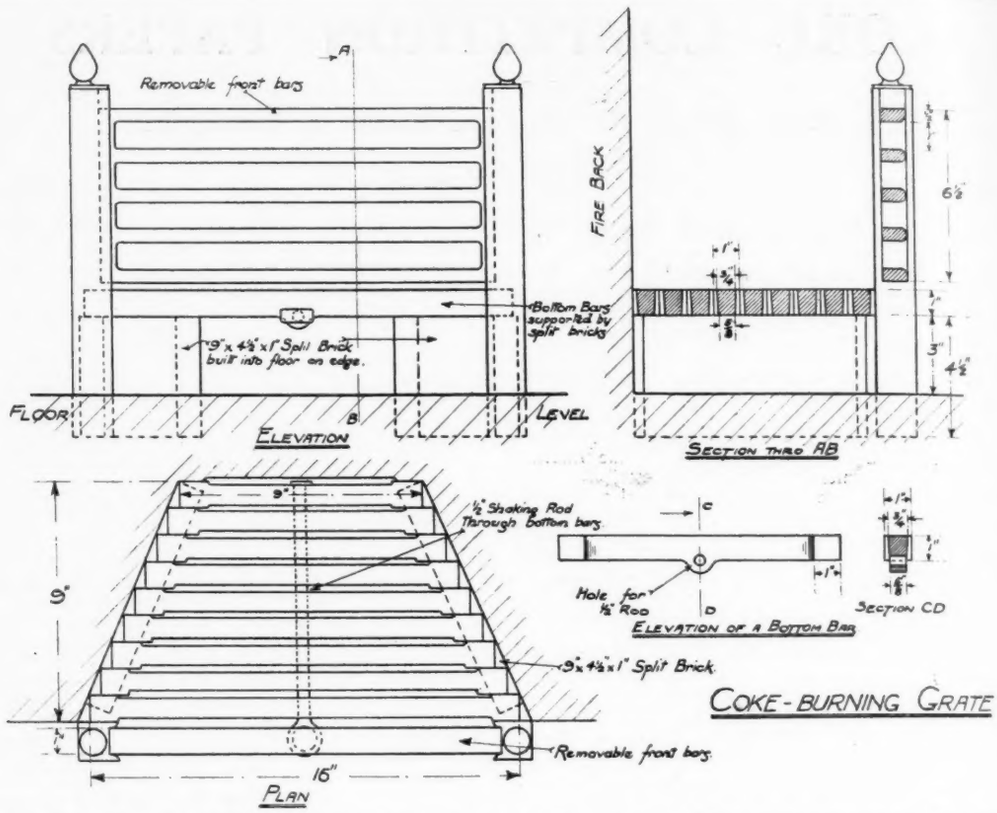
No. 5, washed coke nuts, is preferred for forges and special engineering purposes. Pea breeze is sometimes in demand, but has a limited sale.

No. 6, the residual "sinkers," is the bye-product of washing. The quality will depend somewhat on the length of time the coke nuts are left in the water of the small circular iron tanks into which they are thrown. The time given is usually only a matter of ten to fifteen seconds before the floatings are removed by a riddle of ¾ in. mesh. The longer the time given, the lower the ash content of the washed coke nuts. At the same time, they are more thoroughly soaked with water, and require longer draining. The ash of the sinkers is affected in the opposite direction by the duration of immersion. The only economic uses for the sinkers are steam generation or gasification, mixed with other fuel, in external producers.

COAL *versus* COKE.

General Advantages of Coke.

1. *Smokelessness.*—This is an advantage that even yet is not sufficiently appreciated, in spite of smoke abatement societies and a good deal of propaganda. The revolutionary improvement in the atmosphere of our towns which would be effected by the replacement of coal by coke is realized by all who observed city atmospheric conditions during the coal stoppage of 1921, when in many places coal stocks were completely exhausted, and coke had of necessity to be burned instead of coal.
2. *Cleanliness.*
3. *No Danger of Spontaneous Combustion* in storage.
4. *Higher Furnace Temperatures* can be attained.
5. *Greater Radiation Efficiency* than with coal, owing to the high temperature and absence of smoke.
6. *Greater Uniformity of Heating* is possible, as the fuel does not undergo distillation.
7. *Net Calorific Value.*—Though the gross calorific value is not so high as that of the coal from which it is made, the net calorific value is very little less (not more than 1 p.ct.) than the gross, whereas with coal, owing to the higher hydrogen content, the deduction one has to make from the gross value to arrive at the net is about 4 p.ct. It is, in nearly every case, only the net calorific value that counts in a fuel (the heat of the condensed steam formed by combustion not being recoverable); and, strictly speaking, fuels should be compared one with another on a basis of net value.
8. *The Cost per Therm* is generally less than that of coal,



though often there is very little difference. In domestic heating the cost per effective therm is invariably considerably less than that from coal, on account of the greater thermal efficiency.

Disadvantages.

1. *Greater Ash Content.*—This, on an average, is 50 p.ct. more than that of gas coal. It depends in the first place on the cleanness of the original coal. This is a matter beyond the coke salesman's control, and can only be kept right by careful buying, checking of coal consignments, or, better, by organized supervision of the coal as dispatched from the collieries.

The price of a solid fuel depends, or should largely depend, on the percentage of ash it contains. Thus, best house coals with an ash content as low as 3 p.ct. command a much better price than do second-rate coals with an ash content of 7 p.ct., though the heating value of the latter is reduced by only 4 p.ct. by the greater weight of ash. The average amount of ash which I have found in a number of representative local house coals is about 5 p.ct.

The native moisture of the coals, together with the ash, restricts the heating value. For the coals of Northumberland and Derbyshire, where the inherent moisture is as much as 5 to 7 p.ct., the calorific value averages about 13,200 B.Th.U. Durham and Yorkshire coals, on the other hand, with 2 p.ct. of moisture and a much smaller oxygen content than the aforementioned coals, have a higher value—namely, about 14,200 B.Th.U. calculated on the same ash content of 5 p.ct.

As is well known, house coals are not bought by the therm. A fancy price is demanded for a coal particularly low in ash, and one could imagine that an ashless coal, if such could be had, would fetch an exorbitant figure, just as oil-coke, practically ash-free and free-burning (containing about 8 p.ct. of volatile matter) can be sold for domestic use at 90s. per ton.

On the other hand, a coal regularly containing 20 p.ct. of ash would fetch a very low price as a domestic fuel—if, indeed, it could be sold at all. Therefore, when one finds coke containing occasionally as much as 21 p.ct. of ash sold in towns for central heating and other purposes, one cannot be surprised if this fuel is not given a second trial for open house fires or for kitchen use.

It is necessary to consider the point of view of the fireman, or housemaid, who has to clean the fires, and to remember that a coke with ash content of 18 p.ct. gives three times as much trouble as regards ash removal as one containing only 6 p.ct. I have been told, for example, of collieries in the Midlands making at their coke ovens coke for the London market from washed coal containing not more than 4 p.ct. of ash. The coke thus obtained, with 6 p.ct. of ash, was able to supplant ordinary local gas coke with 13 or 14 p.ct. of ash.

I am convinced that, if the ash content of coke were reduced to a standard limit of 10 or even 12 p.ct., it would result in making domestic coke much more popular than it is at present. No matter how well it is sized, or how dry it is—and these are most important matters—high ash militates against kindling, stoking, cleanliness of the room, and complete combustion. It does, in fact, condemn it at once in the eyes of the user, unless he or she is an ardent smoke prohibitionist or is prejudiced in favour of the gas industry. An ash content of 15 p.ct. or over is in my opinion absolutely unwarranted. One might say it is due to culpable negligence as regards the purchase of coal.

2. *Difficulty of Ignition.*—This is the second great trouble with regard to domestic coke. As an advocate for many years past of the use of coke for household purposes, I have frequently been asked, "How do you manage to light it?" True, if the coke is very wet, large or very small, and very well "burnt off" (with a very small residuum of volatile matter), there is difficulty. Given, however, suitably sized dry coke of ordinary manufacture, one need never have a failure, especially if advantage is taken of the very convenient gas pokers now to be purchased at any gasfitting shop. Some cokes, particularly those obtained from heavily steamed continuous vertical retorts, though small and dry, are not so easily ignited as other kinds of coke obtained perhaps at lower retort temperatures and without steaming. The continuous vertical coke shows not more than 1 p.ct. of volatile matter by the standard seven minutes test in the bunsen flame, whereas unsteamed charges, carbonized at not too high a temperature, show about 3 p.ct. The extra 2 p.ct. makes a remarkable difference in the ease of ignition and in the liveliness of the fire.

Dense coke—*e.g.*, oven coke nuts—with less than 1 p.ct. volatile content presents the most formidable proposition in starting an open domestic fire; but even this type of fuel can be used by the experienced. To make the coke popular, however, I recommend a minimum of 3 p.ct. of volatile matter.

3. *The Calorific Value* of coke is distinctly lower than that of coal, even if calculated on a moisture and ash free basis. This is due to the fact that coal has a certain small content of hydrogen (4 to 5 p.ct.) which has a much higher heating power than any other substance per unit weight. Hydrogen, in fact, has a calorific value of about 63,000, as against 14,600 for carbon. An ashless dry coal might have a value, therefore, of as much as 15,500 B.Th.U.; but an ashless dry coke, well burnt off, if such were possible, could hardly exceed 14,600 B.Th.U., because there is practically no hydrogen left in it. It is possible, however, for low-temperature cokes of certain types of coal (high in oxygen) to have a higher calorific power than the parent coals.

One finds in literature misleading statements regarding the heat value of coke, detracting unduly from its heating merit in that far too low a value is quoted. Thus, in a recently published gas engineer's compendium, coke (presumably dry) with an ash content of 8 to 10 p.ct. is stated to have a value of 11,500 B.Th.U., while coke breeze is put down at 9000 B.Th.U. The former cannot be less than 14,600 B.Th.U. *less* 10 p.ct. = 13,140, while the latter, with (say) 17 p.ct. of ash, would be not less than 14,600 *minus* 17 p.ct. = 12,120 B.Th.U.

The other disadvantages under which coke labours are of less importance.

4. *Greater Bulk.*—This is practically 50 p.ct. more than coal.

Coal runs about 43 c.ft. per ton, while gas coke varies from 60 to 75 c.ft. per ton. The ascending order of density of different kinds of coke, named after their respective methods of carbonization is as follows: Continuous verticals, horizontal retorts with small charges, horizontals with large charges, intermittent verticals, coke ovens, beehive ovens.

5. A deep bed of fuel is required to maintain combustion, unless the draught is specially good.

6. A back-draught causes a smell of burning sulphur, which is much more noticeable with coke than with coal, although the actual sulphur content in the latter is the same as in the coke.

DOMESTIC OPEN GRATE FOR BURNING GAS COKE.

I submit a drawing of a coke-burning sitting-room grate, which, I believe, will be found to give useful particulars to those who wish to know exactly the design that is more or less desirable. It has, as a matter of fact, been designed to replace a well-grate for burning coal in my dining-room; and the introduction of coke has been so successful that it has quite eliminated the smoke and down-draught trouble formerly experienced with coal when the wind came from a certain direction. I may say that previous to installing this type of grate I experimented with the barless pattern of coke grate recommended by Prof. Boys, but without success.

The main features of the design are:

The bars of the grate are separate and loose. This is of advantage for renewals and ease of casting. I have found that the ordinary cast-iron grate, cast in one piece, has a comparatively short life, and is rather expensive to replace.

The middle lower portion of each bar is perforated to allow of the passage of a shaking rod, ½ in. in diameter. This allows the grate to be agitated by hook, to clear the bottom of the coke fuel bed from the ash dust which accumulates and blocks the air passages, and so stops combustion after the fire has been going for a few hours.

The bars are supported on two "split" fire bricks. They are of V section and are spaced ¼ in. apart at the top.

The front part of the grate is removable, for easy access for cleaning and ignition. When a gas poker is utilized, very little firewood is necessary, 3 or 4 oz. being sufficient to light the fire; but it is always advisable completely to fill the grate with coke of the proper size after lighting.

As an alternative to the removable front, single vertical bars passing through holes or slots in two parallel horizontal bars may conveniently be used.

COMPARATIVE THERMAL EFFICIENCIES AND COSTS.

The following is a tabular statement of values which the coke salesman may find useful, and can vary and multiply according to prevailing or varying costs:

A therm = 100,000 B.Th.U.
A brake-horsepower = 2 545 ,,
An electrical unit = 3,415 ,,

—	C.V.	Therms.	Cost per Ton.	Cost per Therm.
			s. d.	Pence.
a—One ton of coke dust, wet	11,000	244	5 0	0·25
b— ,, ,, coal slack .	11,000	244	17 6	0·86
c— ,, ,, gas coal . .	13,400	300	27 6	1·10
d— ,, ,, gas coke . .	12,500	280	35 0	1·50
e— ,, ,, house coal .	13,400	300	40 0	1·60
f—One electrical unit . .	..	0·034	2d. per unit	58·6

—	Efficiency.	Cost per Effective Therm.
	P.Ct.	Pence.
Open coal fire, fuel (*e*) . .	20	8·0
Open coke fire, fuel (*d*) . .	25	6·0
Gas fire at 7·2d. per therm .	65	11·1
Electric radiator	100	58·6

The "Raffloer" Rotary Retort.

The "Iron and Coal Trades Review" for Feb. 5 contains an article describing the "Raffloer" rotary retort. This differs from most types of rotary retort in that, though the retort rotates, and the coal charge with it, the rotation is not for the purpose of keeping the coal in movement, and thereby facilitating the distribution of heat through the charge, but to produce a compact solid carbonized product which is delivered from the retort in briquette form. For this purpose a finely-crushed bituminous coal is used which, by an ingenious arrangement, is made to travel the length of the retort in a longitudinal cell or groove in which it is converted by compression and the temperature of the retort into a solid compact body, which at the discharge end is cut into brick-shaped blocks of convenient size by a special apparatus. Near the feeding end of the retort the coal is held in position in the cells by an inner cylinder for a short distance in its travel through the retort, when, due to the heat and a longitudinal roll, it becomes sufficiently compact to be retained in the cell without any support during the rotation of the retort. A piston at the feeding end imparts a forward movement to the coal charge in each cell, which thus contains raw coal at one end, and carbonized fuel at the other. The cylinder of the retort is of steel plate, and the cells are formed by light rails bolted to the plate and extending the full length of the retort. The rotary movement of the latter is entirely for the purpose of feeding-in the raw coal and discharging the semi-coke. The retort is heated externally by gas. In recent years the development of the "Raffloer" retort has taken place mainly in the United States, where the New York gas administration have introduced a trial plant. The length of the retort is about 40 ft., and its daily throughput about 50 tons of coal. The briquettes formed are very dense, and require no quenching. The process may be regarded as a combination of a low-temperature carbonizing system with bye-product recovery and briquetting.

Gas for the Covered-in Market.—How useful gas proves itself in connection with the equipment of covered-in markets is shown in No. 143 of "A Thousand-and-One Uses for Gas," just issued by the British Commercial Gas Association. There are photographs of a number of excellent lighting installations in markets in London and the Provinces and attention is drawn to other purposes for which gas is invaluable.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.—A special general meeting of the Association will be held at the South Wales Institute of Engineers, Cardiff, on Thursday, Feb. 18, at 2.30 p.m. The chair will be taken by the President, Mr. H. D. Madden, M.Inst.C.E., and an address will be given by Mr. W. M. Mason, of the British Commercial Gas Association, on "A New Spirit in an Old Industry." Members will visit the gas exhibits at the "Better Housing and Housekeeping" Exhibition, Drill Hall, Cardiff.

Samuel Clegg and Mechanical Stoking.

On Jan. 27, before the Newcomen Society, Mr. David Brownlie read a paper dealing with the work of John George Bodmen, and particularly his remarkable pioneer investigations concerning the mechanical stoker. In this paper the author sets out to prove that Bodmen—and not John Juckes, as is commonly stated—is the real inventor of the chain-grate stoker. He mentions that the idea of the latter may have been got from Samuel Clegg, who devised a retort in which was employed an endless band conveyor, composed of wrought-iron plates jointed together, upon which crushed coal was fed and carbonized. This system, it will be noted, is on similar lines to the Caracristi-Piron process, except that the latter uses molten lead for heating, instead of a fire. There is no record as to where this retort was worked or when it was invented. Mr. Brownlie suggests it was in 1825, or a little earlier. Many of the details of construction (as described in "A Practical Treatise on the Manufacture and Distribution of Coal Gas, &c.," by Samuel Clegg, jun., third edition, 1859) are the same as in Juckes' design of chain-grate stoker of 1841.

Gas-Works Pumps.

A pump designed to meet the demand for machines with a low maintenance cost, capable of dealing with water containing grit, &c., is manufactured by the Pulsometer Engineering Company, Ltd., of Reading. This, which is known as the "Pulsometer" centrifugal slurry pump, is most suitable for the work of coke quenching, and has the advantage that renewals or repairs can be quickly effected. The pump has no renewable liner, but the casing or volute itself, which is of very simple form, is readily replaced when worn out, as it is fitted with registering spigots for automatic alignment. Many of these slurry pumps are in use in gas-works, and the results are highly satisfactory. Two other pumps manufactured by the same firm for dealing with water containing abrasive substances are the "Flexala" and the "Resiline." The former, which is intended for non-corrosive liquid heavily charged with abrasive matter such as clinker, has a front cover provided with a coating of rubber vulcanized to the inside face. Spiral grooves are moulded in this rubber coating, which effectively protects the metal of the cover from wear. The "Resiline" pump is so named because the whole of the impeller and interior casing are covered with a lining of resilient rubber. This lining is effectual in protecting the metal from the corrosive effects of almost every class of acid encountered in industry. It is of interest to note that many of the firm's "C.V." centrifugal pumps are in successful operation in gas-works.

Southern Association of Gas Engineers and Managers.—It is announced by the Hon. Secretary (Mr. H. C. Smith) that the annual general meeting of the Association will be held at 2.15 p.m. on Tuesday, March 23, at the Hotel Cecil, Strand, W.C.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Policy.

SIR,—The industry will have cause in the future to appreciate greatly your initiative in raising the question of policy at the present time; and the expressions of opinion which it is bringing out—candid in degree, but sincere in purpose—are all to the good. To me it is like a breath of oxygen after being partially gassed, to realize that plain speaking is at last to have an innings; but it is to be hoped it may be candid without being personal either to ourselves or our competitors. There is over 100 millions of investors' money in the company concerns alone, and nearly 60 millions of local authority capital in the form of public loan stock.

That the policy pursued in the near future, both as regards electricity and gas, will dominate the future of both, is a platitude; but while electricity is receiving widespread publicity, gas is silent in so far as public opinion is concerned, and the man in the street has little, if anything, upon which to form an opinion regarding it. As electricity has become a "shuttle of the political parties," it is imperative that gas should bestir itself to make known its economic merits, not to those within its confines, as this is superfluous, but to the larger public, who do, in fact, influence the mind of the public man, who, from what appears in the Press, is obsessed with the merits of electricity, and indifferent, if not hostile, to, although doubtless ignorant of, the merits of gas.

We must, I think, admit that few people have a good word to say for gas. To some extent this is due to unsatisfactory service. When candle power was the test of quality, it mattered not where one went—whether to a south country town of 14 C.P., or to a north country town of 18 or 20 C.P., or to Scotland with its 28 to 30 C.P.—the common complaint was "bad gas." Why? In consequence not of *quality*, but of *quantity*. A deficient supply at certain times of the day, and more so upon certain days, was the root cause of this; and it arose from deficiencies in the distribution system, the demands on which in very many cases had outgrown the capacity. Thanks to modern legislation, this is being intelligently dealt with; but the stigma lives, and in some parts of most areas is still justifiable, although much has been done of late to remedy it. Let anyone really interested call for pressure charts of 1900 and 1925; and the way in which the distribution system has been stressed will be apparent.

There is no call to speak disparagingly of electricity supply; above all, gas men must be silent under this head. It has its place; and many use it to-day in gas-works for convenience—thus showing our impartiality. But it cannot do what enthusiasts claim for it; and it is imperative that the gas industry should take immediate steps to educate "public opinion" to the facts, and show what gas is doing to-day in relation to its competitor, and what it can be made to do in the future.

How can this propaganda be initiated? Any statement published by the gas industry is necessarily looked upon as tainted, although we know that the investigations on record have been carried out by highly qualified and impartial persons, with a view to determining, for the information of the industry itself, the real merits of gas as contrasted with the only competitor it is up against. It is here where I think the industry has failed. There may be need to convince those within the confines of the industry itself, but it is more important to convince "public opinion;" and the most effective way I can at the moment suggest is that an impartial tribunal should sit to determine the relative services that the two industries can render the public from their respective points of view. It should reduce to a common formula the production costs, and the distribution costs in (*a*) closely-populated areas, (*b*) urban areas, and (*c*) per mile of country crossed with little (if any) demand for service. The next most important thing for the consumer is the probable cost of equipping his premises with typical apparatus for the employment of gas or electricity.

If some such investigation were made, and published, backed by the names of men whose impartiality is well known to the public, we should hear a good deal less of the fantastic expectations that so often appear in various prints regarding what electricity can do. A great deal of this information is already on record, both as regards gas and electricity undertakings; and it will be wise to accept such figures where they do exist. They must be clearly translated into the terms of each industry, and presented to the public in an easily apprehended formula.

W. R. HERRING.

Howard House,
4, Arundel Street,
Strand, W.C. 2,
Feb. 4, 1926.

Prof. Boys' Coke Fires.

SIR,—Four years ago (Jan. 11, 1922, p. 81) you published a short article on my method of burning gas coke in the domestic fireplace; and about eighteen months ago the London Coke Committee printed a pamphlet in which I went into the subject somewhat more in detail (see "JOURNAL" for Nov. 19, 1924, p. 523). By this means, the gas industry have had before them the result of my experience; and I certainly expected that, on the whole, more would have been done by them than has been the case to test the value of the plan which I advocated. The series of papers published in connection with the recent Coke Competition has shown that, in some hands my results have been attained, whereas in some they clearly have not.

If you can spare the necessary space, I should like to say that I did not sufficiently emphasize the importance of using *un*broken coke—large, small, all sizes just as it comes—and avoiding above all things coke broken to a small even size and screened, which so often is thrust upon the consumer. Breaking coke and screening coke both cost money, and produce small and breeze of little value. Avoiding these processes is an advantage, more especially if the result is better. So much is the result better that one gentleman of enterprise—a stranger to me—who, with no encouragement from any quarter, had set-up a fire as near as he could to my directions, finding a poor result, wrote to me for guidance; and I suggested that he probably had been using coke broken and screened to a small even size. This proved to be the case; and on getting unbroken coke, he found all went as I had said, and he is interesting his neighbours in his county district in his fire.

My fire is only 14 in. in width at the front, and 12 in. from front to back; and in this I often have pieces measuring as much as 8 in. in one direction. These and all smaller, taken just as they come, make a perfect fire. Coke broken into 2-in. pieces alone makes a sickly fire, such as I have seen in a certain club where ovoid briquettes were being tried in an open fire. Unless a strong draught is provided, air friction prevents such a fire from burning properly.

It may be of interest to state that I have found it possible to make dense furnace coke burn, and burn brilliantly, on the hearth in my house, lighting it from cold with wood only; but it was not so easy to light as gas coke, and had to be broken smaller. Then, if a large fire suitable for cold weather was needed, it gained about as much in convenience in consequence of its smaller ash content as it lost from the greater care required in starting-up with wood only from cold. In any case, in lighting a coke fire it is better to concentrate the wood in the middle of the hearth, and put the coke on the sides and above; and then the speed with which coke becomes hot throughout compared with coal will cause the fire to spread laterally in a satisfactory manner.

So satisfactory is the domestic fire such as I have described fed with "common" gas coke, that the reiterated demand for low-temperature carbonization as a necessity for obtaining a smokeless fuel for domestic use is really absurd. I, of course, know nothing of the question of cost of production or value of bye-products. If, or when, these are satisfactory, such fuel will come along of its own accord, and no political pressure or clamour will be needed to ensure its greatly extended use. If, however, the economic side is weak, then, as gas coke made by high-temperature carbonization gives so admirable a fire, there is no necessity in the public interest to force the pace.

May I suggest that the country gas manager might increase the sale of his coke *pari passu* with its production, if he would set-up a coke-burning hearth in his showroom, and then persuade the proprietor of the leading local hotel to have one fitted in the hall or dining room under a satisfactory arrangement as to the supply of coke (*unbroken*), so that business people who all meet there should do so before such a fire, and thus learn its advantages. It would appear that it is the absurd simplicity of the coke-burning hearth which has prevented more attention being paid to it. Naaman scorned a bath in the Jordan; and though our experts do not go away in a rage, they still seek some big thing in the form of low-temperature carbonization.

C. V. BOYS.

66, Victoria Street,
London, S.W. 1,
Feb. 3, 1926.

[The above letter is referred to in the editorial columns.—ED., G.J.]

The Devonport Trouble.

SIR,—With reference to the Devonport trouble, in which the name of a "Mr. Carr" is mentioned, I should like to state that I am in no way connected with the case, and, furthermore, that no plant has been supplied to Devonport by my firm.

RALPH CARR,
Director and Secretary
Davison & Partner, Ltd.

11, Carteret Street, S.W. 1,
Feb. 8, 1926.

Railway Rates and Charges.

SIR,—The enclosed appeal is being broadcast by the Traders' Co-ordinating Committee for funds to enable them to complete the work which they have been carrying on so successfully on behalf of the trading interests of the country during the current revision of railway rates and charges.

I would remind you that this Committee was formed some five years ago, to co-ordinate and represent the interests of traders before the Railway Rates Tribunal. Prior to its formation there was a total lack of co-ordination in the presentation of the traders' case, which inevitably re-acted to the detriment of the business community; but the Co-Ordinating Committee have been able to do such extraordinarily useful work that I hope you will be able, in your columns, to bring their appeal to the notice of your readers, many of whom will probably wish to subscribe.

SIDNEY ROGERSON, Publicity Manager.

Federation of British Industries,
39, St. James's Street,
London, S.W. 1,
Feb. 3, 1925.

[ENCLOSURE.]

The Burden of Railway Charges

SIR,—You are paying some 50 p.ct. more for rail carriage to-day than pre-war, and are threatened with a further serious increase.

You are therefore vitally interested in the joint effort which the bodies represented upon our Committee are making to state the traders' case before the Railway Rates Tribunal. The particulars enclosed prove how serious would be the effect on your industry of failing to make your case heard. You are asked, by contributing your share of expense, to enable the defence to be carried on.

Two years ago, as you may remember, the Committee appealed for £20,000 for this work. Only £14,000 has been contributed; and this sum has almost been exhausted by the special legal and accountancy fees without which the traders' case could not have been presented. Unless the remaining £6000 is contributed in the next few weeks, the Committee will have to consider abandoning their case. Only 300 donations of £20 each, or 600 of £10 each, are needed to prevent the stoppage of the work. It is hoped that the larger firms in your industry will contribute at least on this scale; but subscriptions from smaller firms will be welcomed.

The results already achieved by the Committee have only been made possible by the generous support of firms all over the country. The matter is now one of extreme urgency, and my Committee confidently appeal to you to contribute as generously as possible.

T. P. LONG.

Traders' Co-ordinating Committee,
39, St. James's Street,
London, S.W. 1.
Feb. 3, 1926.

REGISTER OF PATENTS.

Protection of Gasholder Interiors.—No. 235,880.

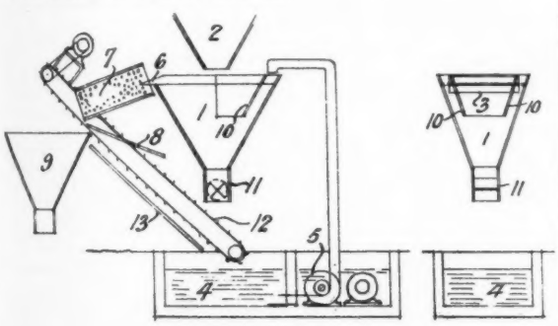
LECHLER, P., of Stuttgart.
No. 15,585; June 16, 1925.
Convention date, June 20, 1924.

After clearly detailing the risks of corrosion of the interior surfaces of gasholders by present-day stripped gas, the patentee says that an artificial interior oiling of the walls can be achieved easily, and with a small expenditure of material if care is taken that an intensive covering is effected by means of a jet, which is under great pressure and is applied right round the inner walls and preferably at a height slightly above the level of the sealing water. It is only necessary to employ as much well oil as is required in the normal manner to cover the inner walls of the holder with a protecting layer, because the oil applies itself in an almost concentric layer, adhering firmly to the inner walls of the holders at the inner surface of the water; and when the lifts descend their inner walls are automatically covered with protecting oil. In this manner it is possible on the one hand technically to effect a complete separation of the hydrocarbons necessary for industry, and on the other to preserve the large values invested in the gasholders for the national wealth.

Classification of Ash, &c.—No. 244,579.

HADFIELD, G. H., of Merton Park, S.W. 19.
No. 29,601; Dec. 9, 1924.

This invention relates to the classification of furnace ash, gas retort ash, household refuse, &c., by means of water or fluids such as clay suspensions in water or petroleum.



Hadfield's Separator.

We reproduce two sectional diagrams of the apparatus. From these it will be understood that 1 is an inverted cone filled with a clay suspension in water on to which the material to be separated or classified is dropped from a hopper 2. 3 is an agitator or stirrer to effect more complete immersion. 4 is a sump of greater capacity than the separating receptacle, and 5 is a pump which keeps the liquid in circulation from sump 4 to cone 1, from which the liquid overflows at the lip 6 to a screen 7. The lighter contents—*e.g.*, coke—are carried by the overflow of the liquid on to screen 7, and the liquid itself drains through the screen, and is returned by a trough 8 to the sump. The coke is received in a container 9, from which it may be delivered to storage bins, being washed, elevated, and drained ready for use.

Cone 1 has an inner jacket 10 tending above the level at which the liquid overflows the lip, and some way down and around the sides. The liquid is delivered into the space formed by this jacket, and can only escape in an upward direction into the main portion of the cone, thus forming a gentle upward current. At the bottom of the cone is a straight funnel 11 into which the heavier separated constituents fall. This funnel portion may be emptied by means of a star valve; and the heavy constituents are received on another screen 12 in the form of an elevator with perforations to permit of any liquid escaping being drained back by a trough 13 to the sump.

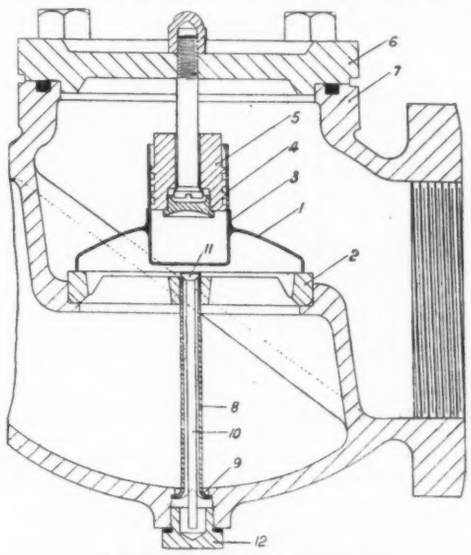
In the provisional specification the patentee says: "This is an important simplification of such separators as those sold under the registered trade mark 'Columbus' inasmuch as the solids are removed by their own weight instead of by worm gear or the like. The rate of separation is increased. The liquid utilized where it consists of a suspension such as clay is homogeneously mixed by the pump. The material is more effectively drained and the necessity for constant replenishment or adjustment of the liquid is obviated. The movement of the liquid by a pump instead of the solids by worm gear involves less wearing-out of plant and is simpler to operate."

Non-Return Gas Valve.—No. 244,923.

KEITH & BLACKMAN CO., LTD., and KEITH, G., both of Farringdon Avenue, E.C. 4.
No. 412; Jan. 6, 1925.

This invention relates to a non-return valve for gas supply connections—for example, for supply of gas furnaces—whereby to obviate the possibility of air under pressure finding its way to the gas mains and producing an explosive mixture.

An object of the invention is to provide a construction incorporating a valve proper which is so light that it does not materially affect the gas pressure, and yet is stiff enough to withstand any pressure to



A Keith-Blackman Non-Return Valve.

which it is likely to be subjected from the outlet side. Another object is to prevent "dithering" of the valve proper when passing a small quantity of gas; experience having shown that continuous chattering tends to cause fatigue of the light metal and eventual breaking-up.

We reproduce the vertical section of the valve which accompanies the specification.

The edge of the dome-shaped valve 1 bears on the valve seat 2; and at the summit of the dome is an apertured neck 3 to which is fixed a dash-pot cylinder 4 movable relatively to a piston 5 suspended from the cover 6 of the valve casing 7. The arrangement permits the value proper to take its seat correctly and still allow free relative movement of the dash-pot cylinder and piston without biting.

The valve seat 2 is held in place by a tubular screw 8, the head 9 of which is so formed as to allow any water which may gather in the lower portion of the casing 7 to be drawn off by way of a plugged orifice at the bottom. To permit the valve 1 to be raised from the seat in the event of its sticking thereto, as it might be caused to do by deposit of naphthalene or the like, a light rod 10 having a small head 11 at the upper end is mounted within the tubular screw 8. In the event of the valve sticking, the plug 12 can be removed and the valve 1 lifted from the seat 2 by manipulation of the rod, without escape of any large amount of gas.

Prepayment Meters.—No. 244,977.

HANSFORD, J., of Enfield.
No. 9164; April 6, 1925.

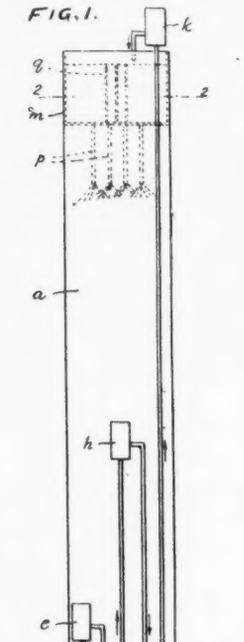
The patentee claims: In a prepayment gas meter, a coin mechanism comprising an outer casing enclosing two inner casings, a handle on one inner casing supported in a dial, and two stops on said casing capable of engaging with a stop on the second inner casing and a stop on the dial, another stop on the second inner casing engaging with a stop on the outer casing, and a ratchet on the second inner casing engaging with a ratchet wheel on a spindle operating the supply valve.

Removal of Sulphuretted Hydrogen.—No. 245,575.

WOODALL-DUCKHAM (1920), LTD., SMITH, E. W., and FINLAYSON, T. C., all of Grosvenor Gardens, S.W. 1.

No. 29,732; Dec. 10, 1924.

This invention relates to the revivification of the spent liquor in a liquid purification process. The latter consists of washing the gas



Revivifier for Liquid Purification—Woodall-Duckham Companies.

with liquor capable of revivification by air, and generally consisting of a solution of an alkali (for instance, sodium carbonate) containing in suspension a compound of iron (for instance, ferric hydroxide), the spent liquor being regenerated by blowing air through it, or by allowing it to descend in distributed form a tower into the bottom of which air is pumped. The sulphur which separates during the regeneration is removed in any desired manner.

The patentees explain the invention by means of diagrams, which we reproduce, as follows:

a is the alkaline absorption tower. The liquor charged with sulphide flows from the bottom of the tower by pipe *b* into the emulsifier *c*, where it is mixed with air in known manner; the emulsion rising up pipe *d* into the separator *e*. Here the air leaves the liquor, which now flows down pipe *f* into the second emulsifier *g*. Having passed in like manner through a second separator *h* and a third emulsifier *i*, the liquor finally arrives at the third separator *k* at the top of the tower. From *k* the liquor flows into compartment *l* (fig. 2) of the cylindrical tank *m*. From this compartment the liquor, if it should require further regeneration, is allowed to flow down a pipe into the emulsifier of an air-lift not here shown, but similar to *i*, and is raised therefrom into a separator similar to *k*, at the top of the tower, and so to compartment *n*. This course may be repeated with yet another emulsifier until the liquor finally arrives in compartment *o*, whence it flows into the distributors *p* of the absorption tower. The sulphur produced by the regeneration of the liquor rises to the surface in the form of a frothy scum in each of the aforesaid compartments, and flows over into the axial pipe *q*. This is connected with a discharge, not shown, which delivers the sulphur and accompanying liquor into a centrifuge at ground level.

Manufacture of Water Gas.—No. 245,688.

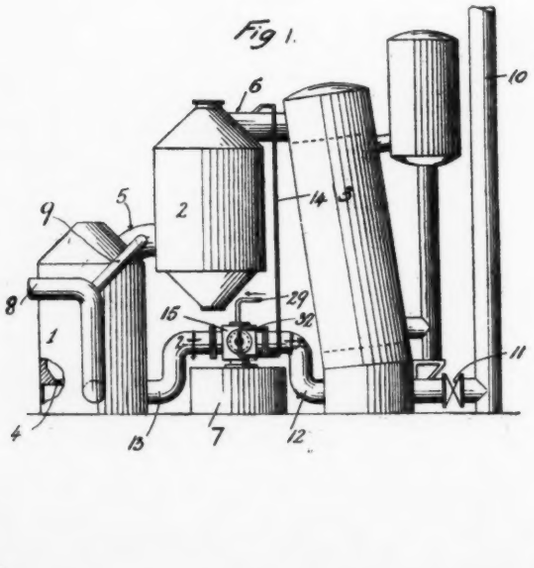
HUMPHREYS & GLASGOW, LTD., of Victoria Street, S.W. (Assignees of CHRISMAN, C. S., of West Chester, Penn).

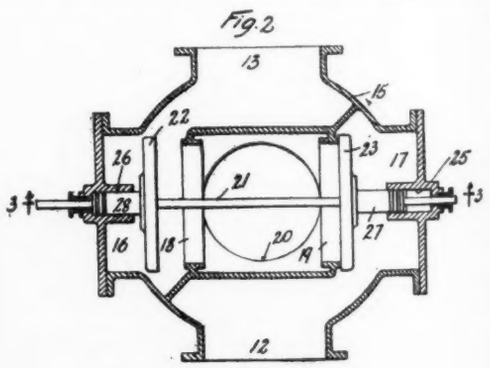
No. 20,815; Aug. 19, 1925. Convention date, April 18, 1925.

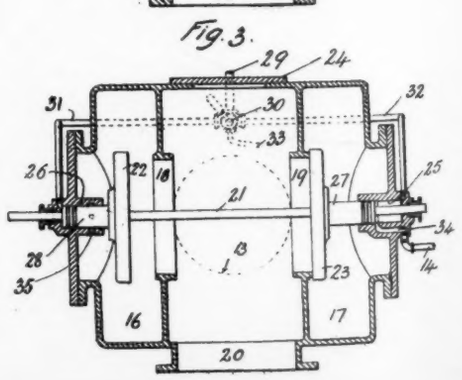
The principal object of this invention is to provide for easily and safely reversing the flow of steam and gas through a water gas apparatus by valve means external to the path of the products of combustion. Another object is to provide that the valve means shall automatically control in its operation the steam supply to the water gas apparatus. Another object is to provide for the employment of reversing valve means which shall be comparatively inexpensive in first cost and maintenance in comparison with what are commonly called "hot valves," which are dispensed with. Another object is to take advantage of the difference in pressure due to the fuel bed in order to insure that the reversing valve, when positioned, shall be forced to seat.

We reproduce the drawings which accompany the specification. Of these, fig. 1 is an elevational view illustrating a blue water gas set; fig. 2 is a sectional plan view, to an enlarged scale, taken generally on the line 2—2 of fig. 1, and turned through 90°; and fig. 3 is a sectional elevational view taken on the line 3—3 of fig. 2.

The main portions of the apparatus will be understood from these drawings. As for the main features of the invention, 15 is a valve casing arranged outside of the vessels of the set, and it has two admission chambers 16 and 17 respectively communicating with the end connections 13 and 12 of the set. These chambers are provided with ports 18 and 19 leading to the outlet chamber 20 that communicates with the wash box 7. 21 is an endwise reciprocable shaft, and carries a pair of disks 22 and 23 spaced on the pressure side of the ports 18 and 19, and each, when closed, held in position







External Control Valves for Water Gas Plant.—Humphreys & Glasgow, Ltd.

by the pressure due to the difference in pressure at the ends of the set. 24 is a manhole cover. There are steam cylinders 25 and 26 and pistons 27 and 28 for shifting the shaft 21. 29 is a steam inlet connection to a fourway cock 30, from which lead a pipe 31 to the end of the cylinder 26, and a pipe 32 to the end of the cylinder 25, and an exhaust 33 (which may well be contracted to delay exhaust and thus prevent too quick movements of the shaft and valve disks). The piston 27 co-operates as a valve element to cover and uncover a port 34 leading to steam pipe 14. The piston 28 co-operates with the port 35 to admit and exclude steam to or from the chamber 16 which communicates with the connection 13.

With the parts in the positions shown, and with the valve 11 closed, steam is passed from 29, by 32, 25, 14, 6, 2, and 5, to the top of the generator, and water gas is passing from the bottom of the generator by 13, 16, 18, and 20 to the wash box. The pressure on top of the fuel bed is greater than the pressure under it, and acts on the disk valve 23 to hold it to its seat. When the fourway valve 30 is in its right-hand position, steam passes by 29, 31, to cylinder 26, which moves piston 28 and shaft 21 towards the right. Thus the disk 22 is seated, and the disk 23 unseated; and steam passing through the cylinder 26 and port 35 reaches the chamber 16, which communicates by 13 with the base of the generator 1. The greater pressure which exists beneath the fuel bed acts to hold the disk 22 to its seat. The port 19 is uncovered and gas passes by 5, 2, 3, 12, 17, 19, and 20 to the wash box. By a repetition of the described operations, the reversing valve is effective to produce up and down runs—in response, in the present instance, to the manual setting of the valve 30.

There is an advantage in passing steam through the connection 13, in that it insures the removal of gas from the lower part of the generator, where it might be exploded upon the admission of the air for the succeeding blast. In connection with the described reversing valve, it is an advantage that it controls not only the direction of gas flow but also the appropriate location for introducing steam into the generator, so that erroneous connections may not be made. Another advantage of the described reversing valve is that steam is not admitted to either end of the set until communication, at the end of the set at which steam is admitted, with the wash box outlet 20, which leads to a gasholder, is closed.

Burners.—No. 245,619.

LYONS, J., & CO., LTD., of Kensington, and STEEL, W. A., of Wembley.

No. 3745; Feb. 10, 1925.

This invention relates to the automatic raising and lowering of a gas-burner flame by the weight of a vessel and its removal respectively. The patentees point out that arrangements are known whereby either placing a vessel on the hotplate, or moving it laterally into position directly over the burner, effects a full yield of gas. The present invention seeks to combine these two arrangements; the patentees claiming:

1. Apparatus for regulating the supply of gas to stove and like burners having a regulating device operated by vertical and lateral displacement of a vessel relative to the burner, wherein the regulating device consists of a rocking lever having at one end a curved surface of substantially arcuate cross-section, normally extending above the surface of the stove, the other end of the lever consisting of a counterbalance weight connected by link mechanism to the operating member of a gas supply valve.

2. Apparatus for regulating the supply of gas to burners and the like in accordance with Claim 1, wherein the curved surface of the rocking lever is perforated, ribbed, or similarly formed.

3. Apparatus for regulating the supply of gas to burners and the like in accordance with Claim 1, wherein the counterbalance weight is in the form of a bell or like construction, and operates as a shield for the gas valve.

4. The apparatus, &c., &c.

Cookers.—No. 245,639.

RADIATION, LTD., of Grosvenor Place, S.W.1, and DAVIS, H. N., and TWIGG, W. R., both of Luton.

No. 7611; March 20, 1925.

The patentees seek by this invention to combine in one cooker the properties derived from the old-style flue outlet at the top and from the recent development (as emhodied by them in a well-known cooker) of having both burner and flue outlet near the bottom of the oven. Accordingly, they claim:

1. In gas cookers, the provision in conjunction with the oven chamber of an outlet at or near the top and an outlet at or near the bottom, the upper outlet (and the lower one if desired) being controllable by a damper, substantially as described.

2. Gas cookers having the features claimed in Claim 1, and comprising the combinations and arrangements of parts, substantially as described and illustrated.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 3.]

Nos. 2060-2782.

ADCOCK, G.—"Fixing means for gas, &c., meter diaphragms." No. 2628.
AIRD, K.—"Gas-heated ovens." No. 2252.
ALDRIDGE, J. G. W.—"Charging horizontal gas retorts." No. 2644.
APPLEBY, E. G.—"Gas-producers, &c." No. 2287.
BARRON, W. L.—"Gas-cooking stoves." No. 2470.
BENTLEY, G. H.—See Appleby, E. G. No. 2287.
MAIN, LTD., R. & A.—See Aird, K. No. 2252.
MATTHEWS, F. G.—See Aldridge, J. G. W. No. 2644.
PILLINGER, G. C.—"Supply and distribution of gas, water, &c." No. 2379.
PYLE, C. R.—"Gas stove." No. 2630.
SHIPLEY, H.—See Adcock, G. No. 2628.
SOUTH METROPOLITAN GAS CO.—"Spigot cocks." No. 2678.
SOUTH METROPOLITAN GAS CO.—"Refining benzole." No. 2775.
SUNDERLAND, I.—See Pillinger, G. C. No. 2379.
SYLVESTER, L. B.—"Fire-lighting gas burner." No. 2595.
UMPLEBY, F.—"Gas generators." No. 2636.

PARLIAMENTARY INTELLIGENCE.

The second session of the thirty-fourth Parliament was opened by His Majesty the King on Tuesday, Feb. 2.

HOUSE OF LORDS.

Special Orders.

The Bideford Gas Order, 1926, was laid before the House, and referred to the Special Orders Committee.

HOUSE OF COMMONS.

Progress of Bills.

Gas Light and Coke Company Bill: Presented, and read the first time; ordered to be read a second time.

Mynyddislwyn Urban District Council Bill: Presented, read the first time; ordered to be read a second time.

Private Bills.

The Chairman of Ways and Means reported that the following Bills would originate in the House of Lords: Ascot District Gas and Electricity, Barnet District Gas and Water, Chorley Corporation, Darwen Corporation, Halifax Corporation, Horley District Company (Electricity Supply), London County Council (General Powers), and the Newcastle-upon-Tyne Corporation. The Standing Orders have been complied with in the case of these Bills.

Gas Regulation Act.

A copy was presented on Feb. 4 of the draft of a Special Order proposed to be made by the Board of Trade under the Act, on the application of the Newark Corporation.

Local Authorities (Enabling) Bill.

A Bill to extend the powers of local authorities in matters of finance and municipal trading was presented last Friday by Mr. Attlee.

LEGAL INTELLIGENCE.

CLAIM FOR PERSONAL INJURIES AGAINST A GAS COMPANY.

An Unsuccessful Action.

An action bearing upon the liability of a gas company for an accident occurring when they were carrying out work on a consumer's premises was decided in the Bow County Court, last Friday, by Judge Snagge and a Jury. The plaintiff was Beryl Busby, of 12, Erskine Road, High Street, Walthamstow, E.; and she sued the Lea Bridge District Gas Company to recover £100 damages for personal injuries she sustained on Oct. 2 of last year, through, she alleged, the negligence of the defendants' servants. It appeared that the defendants had been instructed to move a gas fire from a sitting room to a bedroom on the same floor; and in doing this they took up a board in the bedroom, leaving the hole unguarded, and taking no precaution to safeguard any person going into the room. The plaintiff fell down the hole, and sustained injuries; and it was claimed that the failure to provide a guard constituted a dangerous trap. The defence was that before the work was commenced the plaintiff was informed that a board would have to be taken up, and therefore there was no trap; it was necessary to open-up for the work. Again, they pleaded that they had no idea the plaintiff intended coming near the hole.

Mr. MARTIN O'CONNOR appeared for the plaintiff; and Mr. WHITE for the defendants.

Mr. O'CONNOR said that the defendants were asked as to the cost of removing the gas fire, and gave a price, which was accepted. On Oct. 2, two men arrived to do the job, and proceeded with the work in the sitting room, where the plaintiff, her husband, and her sister were talking; but they went downstairs almost immediately. Shortly after, Mrs. Busby realized that she had left her jewellery in her bedroom, where the gas fire was being fitted, so she went to fetch it. She heard a man hammering in the sitting room as she went up. She walked into her bedroom, and on the third step she sank into a hole. His case was that no warning had been given that the men were intending to take up a board, and no notice was

put on the door, or obstruction near the hole. The day was dark and dim; and the curtains were drawn.

Mrs. *Beryl Busby* corroborated Counsel's statement.

In cross-examination, she said she never thought the men would be taking up a board to fix a gas fire. She did not know anything about a gas fire, beyond that there was a tap to turn on and a stove. There were no tools about on the floor when she went in, or she would have tripped over them. The carpet was not rolled-back—indeed, the carpet did not reach to where the board was up.

Dr. *Alfred Busby* agreed that nothing was said about the boards having to come up.

Mrs. *Catherine Clark*, sister of the plaintiff, stated that she did not understand gas fires, as she came from Trinidad, in the West Indies, where they had no gas fires. She heard nothing said about the floor boards being taken up, and was sure no notice was given that it was going to be done.

Dr. *George Macarno* said he had attended the plaintiff since she met with her accident. She was frightened, queer, and funny. He attended her from Oct. 3 to Nov. 9, then there was an interval, but he again started attending her on Dec. 15, and had done so ever since. He still thought it necessary to attend.

John Norris, a fitter in the employ of the Company, for the defence, said he received instructions to go to the plaintiff's address to move a gas fire. He told the plaintiff and her husband that he would have to take up a board; and they said: "We will go downstairs, and get out of the way." It was about one hour after the people went downstairs to the time of the accident.

After Counsel had addressed the Court, Judge SNAGGE asked the Jury to answer these questions: (1) Did the defendants' servants warn the plaintiff as to the existence of the hole? (2) If not, were they negligent in not warning the plaintiff? (3) Did the defendants guard or fence round the hole? (4) Was it negligence on the part of the defendants not to guard the hole? (5) Was the plaintiff negligent in failing to observe the hole? (6) What the amount of damages should amount to, if any?—The Jury gave the following answers to the questions: (1) No. (2) Yes. (3) No. (4) Yes. (5) Yes. (6) £75.

Mr. WHITE formally asked for judgment, as the Jury had found that the plaintiff was negligent in not observing the hole.

His HONOUR entered judgment for the defendants with costs.

Mr. O'CONNOR: I ask for a new trial, having regard to the circumstances that the room was dark and the curtains drawn.

His HONOUR said he would not allow a new trial, as the Jury had found that the room was not dark.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There has appeared in the "London Gazette" the following notice regarding an application to the Board of Trade under the Act.

SPECIAL ORDER.

Haslemere and District Gas Company.

To empower the Company to raise additional capital, to establish profit sharing, to make regulations with regard to the supply of gas, and for other purposes.

PLYMOUTH CORPORATION AND THE DEVONPORT GAS-WORKS MANAGEMENT.

The Plymouth Town Council held a special meeting, on the 1st inst., to receive a report of the Gas Committee that they had accepted the resignation of the Gas Engineer (Mr. W. P. Tervet), and recommended the immediate dismissal of the Chief Clerk (Mr. Le Bailly).

The Chairman of the Committee (Mr. J. Clifford Tozer) said that, as the result of a communication made to him on Jan. 8 by a member of the Council, he interviewed Mr. Tervet, who, in reply to his questions, admitted having received money payments from a Mr. Carr. The payments commenced in 1920, and the total amount he had received was about £900. Mr. Tervet said that Mr. Carr (who was engaged as a consulting engineer, and was now deceased) told him that he did not consider that he (Mr. Tervet) was being paid a salary in keeping with his responsibility; and as he himself could not possibly supervise the work at the gas-works, he entrusted Mr. Tervet to do this, and in return paid him two-fifths of his commission. Nobody else knew of the arrangement. The Committee met, and considered the matter was so serious that there was no alternative but to ask the Engineer to hand in his resignation, which he did. A few days later, he (Mr. Tozer) received information that other irregularities existed. Investigations were made, and it was ascertained that material had been removed from the works to the Engineer's house, and work performed there by Corporation men. In the case of the Chief Clerk, it was discovered that he had received Corporation materials on a lavish scale for his private house, where employees of the gas-works had carried out work on an extensive scale; and in both cases the expenses were borne by the Corporation funds. Mr. Le Bailly had confessed that the allegations made against him were true. The Committee had not completed their investigations. As to whether criminal proceedings should be taken against the persons named, he (Mr. Tozer) thought, was a question for the Council to decide.

Several hours were occupied by the Council in discussing a number of resolutions and amendments. It was decided to leave it to the Gas Committee to complete their investigations and to take such action as they might think necessary, and submit a further report to the Council.

The Council also adopted an amendment by Mr. R. McDonald that a Committee of six members of the Council be appointed, with power to examine any official or employee, and to inquire into and report upon the payments made to contractors for work done for the Corporation; also what action (if any) was necessary to ensure that materials, goods, or properties of the Corporation were used only in Corporation work or sold or otherwise disposed of for the benefit of the Corporation.

British Industries Fair.—The Birmingham and Midland Section of the British Industries Fair will be opened on Monday next, Feb. 15, and will remain open until the 26th. The Fair promises to be of a record character. The three great exhibition halls are now crowded with stands, and a fourth hall has been erected as a permanent structure. A visit will be paid to the Fair by the Duke of York, and on another occasion by the Lord Mayors and Mayors of fifty municipalities. The delegations from trade organizations will be more numerous than on any previous occasion.

GAS COMPANIES' RESULTS IN 1925.

Some Notable Increases.

Bath.

A record for the sale of gas has been established. The increase over 1924 is 5 p.ct., and the total quantity sold over 1100 million c.ft. An interim dividend of 5 p.ct. per annum, less tax, was paid in August last; and a final dividend at the same rate is recommended.

Cambridge.

An interim dividend at the usual rates was paid in August last for the half-year to June 30, 1925, and a dividend at the same rates, less income-tax, is declared for the half-year ended Dec. 31.

Cleveland.

A dividend of 2½ p.ct. per annum (less income-tax) is announced.

Dorchester.

There is an increase in the consumption of gas of 7½ p.ct. Final dividends are recommended at 10 p.ct. on the ordinary capital and 6 p.ct. on the preference capital (both less income-tax).

Durham.

Final dividends of 5 p.ct. on the original capital and 3½ p.ct. on the additional capital, both less income-tax, making 10 p.ct. and 7 p.ct. respectively for the year, are declared.

Isle of Thanet.

The sales of gas show an increase of 3·6 p.ct. A final dividend of 3½ p.ct. is recommended, making 7 p.ct. for the year.

Newport.

A final dividend at the statutory rate of 5 p.ct. per annum is declared.

Pudsey.

An increase of 2·43 p.ct. is shown in the sales of gas. An interim dividend of 10 p.ct. per annum was declared last August on the new consolidated 7 p.ct. stock; and a dividend at the same rate is recommended for the past half-year.

Reading.

An increase of 7·34 p.ct. in the gas sales is announced, and dividends at the statutory rates are recommended.

Scarborough.

A large increase in the gas sales of nearly 10 p.ct. is recorded, and a dividend of 5 p.ct. per annum on the ordinary stocks is declared.

Ventnor.

Dividends are recommended of 8 p.ct. per annum on the ordinary capital shares, and £5 12s. on the additional capital shares (less income-tax).

Weymouth.

A dividend on the ordinary stock at the maximum rate of 5 p.ct. per annum, less income-tax, is declared; and the balance at the credit of net revenue account is £15,068. An increase of 5·6 p.ct. in the gas sales is shown.

Whitchurch (Salop).

The sales of gas have been increased by nearly 5 p.ct.; and a final dividend of 6 p.ct. (less tax) is declared.

York.

An increase of 5½ p.ct. in gas sales is reported; and the following final dividends are recommended: On the "A" preference stock, 2 p.ct. (making 4 p.ct. for the year); and on the consolidated ordinary stock, £2 15s. p.ct. (making £4 15s. p.ct. for the year).

THE GAS LIGHT AND COKE COMPANY.

Ordinary General Meeting.

The Two Hundred and Nineteenth Ordinary General Meeting of the Proprietors was held last Friday, at the Chief Office, Horseferry Road, Westminster, S.W.—Mr. D. MILNE WATSON, D.L. (the Governor) presiding.

The SECRETARY (Mr. W. L. Galbraith) read the notice convening the meeting; and the report and accounts were taken as read.

The corporate seal of the Company was thereafter affixed to the register of holders of capital stocks.

The GOVERNOR: Ladies and gentlemen,—When I had the pleasure last year of addressing you, we considered the Bill for providing for amalgamation with the Brentford Gas Company. That Bill received the Royal Assent at the end of June last, and the amalgamation took place on Jan. 1 this year. Mr. R. J. N. Neville, M.P., who had been Chairman of the Brentford Gas Company for many years, was duly elected to this Board; and we have the pleasure of seeing him with us to-day. His presence on the Board, I hope, will be symbolical of the mutual goodwill which has attended this amalgamation, of which I shall have more to say in the course of my remarks.

CAUSE OF THE RISE IN PRICE OF GAS.

The past year has been one of considerable anxiety. Early in the year it became apparent that it would be impossible to maintain the price of gas at the figure we had been charging since June, 1923, as we were met with a most serious slump in the market for residuals—more especially in respect of our principal residual, coke. The price of coke fell away, especially in the export market; and we had no alternative but to raise the price of gas per therm from 8·6d. to 9·4d.; as from June last. This increase in price brought about a reduction in the dividend for the second half of the year from £5 0s. 8d. per annum to £4 17s. 4d. per annum under the provisions of the sliding-scale. I am glad to say, however, that, notwithstanding the increase in the price of gas, we have had an increase in business of nearly 4 p.ct., of which, however, 1 p.ct. represents gas supplied in bulk to the Brentford Company. There has also been a very satisfactory increase of 14,000 in the number of consumers, and of 92,000 in the number of gas stoves sold and let on hire.

CAPITAL SPENT ON EXPANSION.

Dealing with the accounts, before proceeding to other matters, you will see that we have spent nearly £600,000 on capital account; the chief items being £27,000 for new showroom sites, £84,000 for the showrooms themselves, £54,000 for two new ships, and £410,000 for new and additional mains and service pipes, meters, and stoves—these latter items being immediate revenue earners. On the other hand, we have credited the capital account with £83,000 for depreciation, &c. There has therefore been a net increase of capital expenditure of about half-a-million, bringing our debit balance on the capital account to £855,000, as against £348,000 as at the end of 1924. The reason for this growth of expenditure is the enormous increase in our business during the last few years. During 1924, for instance, the increase was 6¼ p.ct.; and with the 4 p.ct. of this year there is an increase of nearly 11 p.ct. in two years, which, in a business of our magnitude, means a very large figure expressed in cubic feet or therms. That the Company are in a position to require the expenditure of additional capital to the extent shown is a very healthy sign, and is an indication of the large development of our business. With regard to the revenue account, coal cost slightly less, but oil, on the other hand, cost us more. Wages cost more, partly owing to an increase in rates which took place at the beginning of last year. Repair and maintenance of mains, service pipes, meters, and stoves cost £94,000 more. This expenditure is in pursuance of the policy the Directors are following of seeing that the Company's apparatus is in the best possible condition, and of scrapping obsolete patterns of stoves and appliances generally. Turning to the credit side of the revenue account, we find that there was an increase of £600,000 in the receipts for gas, partly due to increased business, and partly due to the increase in the price of gas for the second half of the year. There is also a most satisfactory increase in the rental of fittings and stoves of £59,000. When we come, however, to the residual products, there is a decrease in coke of no less than £500,000, and in breeze of £30,000. Tar products are down by £115,000, and sulphate of ammonia by £38,000—a total falling off in residuals of £700,000. It was this slump that necessitated the increase in the price of gas in June. But the higher price, even with the increase in the sale of gas, did not make up the loss in revenue from residuals; and therefore there is a decrease in the balance carried to the net revenue account of £115,000. After paying a dividend at the rate of £5 6s. 8d. per annum for the first half year and £4 17s. 4d. per annum for the second half year, and contributing as usual to the redemption fund, we are carrying forward £108,000, as against £223,000 this time last year.

THE GOVERNMENT'S ELECTRICITY SCHEME.

I suppose there is one question above all others that is in the minds of shareholders present here to-day, and that is the Government's proposals regarding electricity. There has been much talk about electricity during the past few years; and the three political parties in turn—Liberal, Labour, and Conservative—have all shown themselves interested in the subject. At the beginning of last year, the present Government announced that they had appointed a Special Committee, of which Lord Weir was Chairman, to consider proposals with regard to the re-organization of the electrical industry in this country; and in due course it was announced that this Committee had come to certain conclusions. These conclusions were not made public; but from what was said it became quite apparent that the recommendations of the Weir Committee were of a very drastic character. I therefore felt it my duty, as your Chairman, and also as President of the National Gas Council, to call attention to the question at various public meetings during the summer months, and particularly protested against anything in the way of a subsidy being given to the electrical industry. ["Hear, hear."] We now know from the Prime Minister what the proposals of the Government are on broad lines; and we are given to understand definitely that it is the intention of the Government to introduce a Bill early this session dealing with the subject. The main outlines of the scheme are that the country is to be covered by a gridiron of electric transmission cables; that generation is to be concentrated at a few selected stations to take the place of a large number of small generating stations; and that the frequency, at present varying in different parts of the country, is to be rendered uniform. You will agree with me that these proposals are fundamental, and very far-reaching.

POSITION OF THE GAS INDUSTRY.

What, then, is the position of the gas industry in this matter? Let me make it clear at once that the gas industry has no hostility to electricity *per se*, and realizes that electricity renders great and important services to the community—in fact, our feelings towards electricity and the electrical industry are quite friendly. What do we then complain of? We complain, ladies and gentlemen, of the State taking a particular industry under its wing, to the detriment of another industry which has been long and firmly established, and which has every reason to be proud of its useful achievements. ["Hear, hear."] The gas industry has an honourable history extending over 110 years, during which long time it has developed itself and carried out its duties without any assistance from the State.

NO DIRECT SUBSIDY.

The Prime Minister has now assured us, and such assurance is satisfactory, that there will be no direct subsidy. On the other hand, however, he has definitely stated that State guarantees will be granted similar to those granted under the Trade Facilities Acts—a matter which may be of serious import to the gas industry. In this connection, I think that the Government should, in all fairness, be prepared to give equal financial assistance to the gas industry. ["Hear, hear."] In the meantime the National Gas Council, to which this Company belong, have appointed a strong Committee to bring the views of the gas industry generally before the Government, especially on the questions arising out of the guarantees under the Trades Facilities Acts and other points, the details of which it is not necessary for me to put before you. Suffice it to say that the situation is being most carefully attended to. We also complain that the Government should deliberately boost electricity. Many of the speeches which have been delivered upon the subject would lead one to believe that a re-organized system of electricity would cure most of the ills from which the country is suffering. I have pointed out over and over again that electricity, when used for power, enters comparatively little—in fact, very little—into the cost of production in many of the important manufactures of this country, such as shipbuilding, marine engineering, locomotive building, and iron foundries; that although electricity is extraordinarily cheap on the North-East Coast, where it is sold at as low a price as anywhere in America, the North-East Coast has been for a long period in the deepest trade depression of any part of the country. So it cannot be said that electricity is a "cure all."

ELECTRICITY NOT A "CURE ALL."

You will have observed that the Prime Minister also holds this view, and does not think that the industry of this country will be saved by electricity alone. He tells us experts consider that the consumption of electricity should be more than doubled within the next fifteen years. In order to bring about such a condition of affairs, it may be asked in what direction will the electricians seek to extend their activities. It is obvious that they must look to domestic heating and cooking. This is a field largely occupied by the gas undertakings of the country, who supply their consumers' requirements in this respect much more efficiently than the electricians are able to do, and with much greater economy in the consumption of this country's most valuable asset—namely, coal. In the case of gas production, 80 p.ct. of the heat units in coal are recovered, whereas in the case of electricity generation only 20 p.ct. are recovered; and under the most favourable circumstances from three to four times the amount of fuel would be consumed at an electricity generating station, as compared with a gas-works, to deliver the same quantity of heat to the consumer. From the point of view, therefore, of coal conservation, it would be thoroughly unsound if people were to be persuaded to take-up electric heating instead of gas heating.

GREAT NATIONAL SERVICES OF GAS.

We appeal for no favours; but we do ask the Government to give equal prominence to the gas industry. Politicians and others are constantly engaged in drawing rosy pictures of a future electrified England; no mention being made of the services gas is giving, and is capable of continuing to give. They say no harm is going to be done to the gas industry, if there is no subsidy. Do they not realize, I wonder, that this boosting of electricity is the most valuable propaganda for that particular industry? Electricity has a clear field of its own for some purposes; and if this propaganda were limited to this, we in the gas industry would have little to complain of, provided that the outstanding advantages of gas, particularly for heating and cooking, received the same prominence. Gas has occupied this field because of its efficiency; and it should be made clear to the public that this is so, and that the Government are not intending, by the introduction of the Bill, to try to oust gas from its own particular province. If you did not know anything of the subject, you would imagine that nothing had been done, for instance, to reduce the smoke evil, and that the country was waiting for the development of electricity before this particular question could be tackled. Is it realized that there must be well over ten million gas fires and

cookers in use in this country, and that the cleaner atmosphere to which we are now becoming accustomed is largely due to this fact? It may be that super-stations, and one system of frequency, are the way to deal with electricity in this country; and it may be necessary to reorganize the electrical industry. In any case, whatever the Government decide to do, let them see that it is done without injuring another industry that is performing its duty in the service of the community.

AN APPEAL FOR FAIR PLAY.

The propaganda that is going on has already seriously injured the security of gas stocks. You will have noticed how the price of our stock has fallen since the Government campaign began in December—from 88 to 81—and it is the same in many other companies. Nor does it end with the stock. Constant reference to, and praise of, electricity tends to have an influence on the consumer's mind, giving him a prejudice against gas. The Prime Minister and the Government, realizing these difficulties, might do a great deal to reassure both the shareholders and consumers, by openly stating their appreciation of the services rendered by gas in the past and the necessity for its continued use in the future, and by pledging themselves that the Bill should contain such safeguards as may be necessary to protect gas against unfair competition.

THE NEED FOR CHEAP COAL.

What is wanted much more than anything else in this country at the present moment is cheap coal, which enters far more largely into industrial costs than electricity. On coal is based the prosperity of all our great industries—steel, shipbuilding, gas, electricity, railways, and innumerable other trades. It is a question which is all-important, and is right at the base of all national prosperity. The supply of electricity is no doubt an important question in this country; but it is not to be compared with that of coal. During the past year the coal industry has been going through an unprecedented crisis. Unfortunately, the Government subsidy to the coal industry came too late to be of much advantage to this Company, as we had already bought our coal for the rest of the year. As you know, the Government set-up a Coal Commission to inquire into the state of the industry after granting the subsidy. That Commission has been holding many meetings. I attended and gave evidence on behalf of the gas industry. As long as the coal industry is in a state of unrest, there is no chance of the country returning to prosperity. Any form of uncertainty does an incalculable amount of harm, not only at home, but abroad; and it is to be earnestly hoped that some means will be found of getting the coal industry out of its difficulties, and that speedily. Until this question is settled, there is little hope of a trade revival in this country.

PRINCIPLE OF AMALGAMATION.

Turning to other matters, as I said at the beginning of my remarks, the amalgamation with the Brentford Company is now completed, and the officers of the late Brentford Company and the Gas Light and Coke Company are working very happily together. I believe the amalgamation has opened-up a very bright prospect for all concerned. A large outlay will, of course, be required for the development of the district of Brentford; and we are now actively engaged in making preparations to meet the demand which we anticipate will come along in due course. I believe that the principle underlying amalgamation is, in general, sound; and I hope to see an increased number of amalgamations in the gas industry. I am sure this will tend to greater efficiency and cheaper gas. To take one example in our own Company. The Ilford Company's amalgamation with this Company took place in 1922, and already the consumers in the district of the old Ilford Company have saved over £60,000, or £20,000 each year, which is a very fine thing for them.

IMPORTANCE OF GOOD SHOWROOMS.

During the year some criticism has reached me with regard to the Company's policy in connection with showrooms. I have been told that some people wonder whether this is wise expenditure. With regard to this, there can be no possible doubt. In these days, when we have electricity knocking at the door, it is absolutely essential that it should be clearly demonstrated that gas can be used, not only efficiently, but artistically. Being an old industry, it is apt to be assumed by many people that it is not adaptable to modern conditions; and the only way to combat this idea is to show actually what can be done in practice in this respect. I hope that you will walk through the showrooms here, and see for yourselves how artistically and efficiently gas can be used both for heating and lighting. There is no expenditure more desirable and imperative than expenditure on showrooms. It has been said to me by architects, since the showrooms downstairs have been renovated, that, had they only known what was possible, many more gas fires would have been put into the houses which they had built. We have erected new showrooms at Seven Sisters Road and Golders Green, which the Mayor of Islington and the Chairman of the Hendon Urban District Council respectively very kindly opened for us; and we are shortly opening new showrooms at Church Street, Kensington, which I trust will be worthy of the Company.

GOOD RELATIONS WITH EMPLOYEES.

I am glad to say our relations with our employees continue to be very satisfactory. When the Government Widows, Orphans, and Old Age Pensions Scheme was introduced, the employees concerned told us that they were very anxious to subscribe the full amount necessary to obtain benefits under both the Company's pension scheme and the Government pension scheme; and the Directors, after careful consideration—as in all these cases it means that the Company are also involved in an increased expenditure—agreed to this, as they felt it would be very greatly to the advantage of the employees generally.

GREAT VALUE OF CO-PARTNERSHIP.

I cannot allow this occasion to pass without once more calling attention to co-partnership. I do earnestly believe that in co-partnership, properly applied, we have one of the most promising solutions of the industrial difficulties in this country. ["Hear, hear."] I quite agree that in some industries it may be difficult of application; but if it is really earnestly desired by those who are in control of big businesses to bring schemes of this kind into operation, a way out of the difficulties which at first sight present themselves can, and will, be found. Some critics say that, if bad years are met with, co-partnership will be discredited. That seems to me unreasonable. Because a man is unable to save money in bad times, it does not mean that he does not appreciate the opportunity of saving when he has the chance in good times. Another argument that is commonly used against co-partnership is that the benefits given are not large enough to effect any good purpose. There, again, it seems to me to show a want of imagination on the part of those who say this. If they could only put themselves into the other man's shoes, they would realize that, to a man whose means are limited, the fact of having (say) £50 saved and invested is of most material importance to him, and gives him a certain sense of security which he would not otherwise feel. No one imagines that co-partnership can show great benefits, either to the business or individual, in two or three years. Everything must have a beginning; and if once begun, the effect will soon be felt. It may interest you to know that under our scheme, which started in 1909, we have 13,000 co-partners, and the amount of ordinary stock held by them is £575,000. [Applause.] I hope I shall be excused for having referred again to the matter; but it is to my mind most necessary to go on repeating it—especially in view of the difficulties which at present are being met with in industry all over the country.

THE COMPANY'S FLEET.

We have increased our fleet by putting two new ships into commission, which will mainly be used in connection with our Fulham Works; and we have every reason to believe this will be of considerable economy to the Company. I have on several occasions referred to an action by the Castner-Kellner Company on the question of our powers to manufacture chemicals. I am glad to say that, when the plaintiffs' appeal was heard in the House of Lords, the case was dismissed with costs. This, from our point of view, was a very satisfactory conclusion to the long drawn-out litigation. Efforts are being made at the present moment to increase the use of tar for road-making purposes; and this Company are supporting those efforts in various ways.

A RECORD DAY'S OUTPUT.

The working results have been very good during the year; and all the staff and men have worked excellently. They were all tested very much on Dec. 4, when we had a record output of gas. It was a cold, dark day, and the demand for gas was unprecedented. The output was 940,160 therms (or 189,232,000 c.ft.), as against the maximum of 830,785 therms (or 166,157,000 c.ft.) on Dec. 10, 1924, referred to at the last meeting. This was equal to nearly 14 p.c. increase—a very large increase indeed. It is very gratifying to know that this demand was met without unduly straining our powers, and that the consumer had the gas he required at full pressure.

THE STANDARD PRICE.

As I have already mentioned, owing to the price of gas having been increased to 9·4d. a therm, the dividend has been reduced to £4 17s. 4d. per annum. This exactly equals the pre-war dividend. The shareholders may remember that, when our standard price was revised by the Board of Trade two or three years ago, we were given a standard price of 11d. per therm, which, with the actual price charged of 8·6d., allowed a dividend of £5 6s. 8d. per annum to be paid. This dividend was evidently considered then a fair one for the Company. Owing to the drop in residuals, however, we were, as already explained, unable to continue to pay that dividend. Therefore we thought it right to apply to the Board of Trade for a revision of our standard price. We have been most modest in our application, because we felt that if we showed ourselves moderate there would be practically no opposition to the application; and that is why we have asked for a standard price of 11·4d. per therm only. To this I am glad to say the London County Council, the City of London, and the Middlesex County Council have signified their agreement. The Board of Trade, however, will hold an inquiry into the matter; but I hope that the result will be that our application will be granted, and that we shall be enabled to pay a slightly higher dividend. The Company have also lodged a Bill in Parliament with regard to further capital powers, and as to a dividend on the ordinary stock, as well as other matters; and it is with regard to this Bill that the Wharncliffe Meeting has been called. With these remarks, I have much pleasure in moving:

> That this meeting do agree with and confirm the report of the Directors and the Auditors' report and statement of the accounts of the Company as transmitted to the proprietors on the 28th ult.

Mr. HENRY WOODALL: I have very much pleasure in seconding the resolution.

EXPERIENCES WITH ELECTRICITY.

Mr. REGINALD WOODWARD: I have no question to raise on the accounts, for they are, as usual, quite plain and understandable; but I should like to give my personal experience with regard to electricity. Some thirty years ago electricity was installed at my father's place, which was out in the country. We had our own plant; the idea being to use the electricity both for lighting and for heating. So far as lighting was concerned, it was a success; but for heating it was an absolute failure, and within a very short time the radiators had to be removed. It may be said: "That is a long time ago, what is the position to-day?" Well, I could take my fellow stockholders to a house in which electric radiators were installed I think two, and certainly not more than three, years ago. The people, when the cold weather came along the first winter after installation, had to wear overcoats in the house; and now all the radiators have been removed, and either gas fires or coal fires substituted. Well, if we do not have a subsidy given to the sister industry—if it meets us on level terms—we can, I am confident, hold our own so far as heating is concerned. I will give another experience. Years ago in

my house we did our cooking partly with coal and partly with gas. That was very unsatisfactory; and we turned to coal only, which, again, I was not satisfied with. So I thought I would give gas only a chance; and for the year ended Dec. 31 last we burned entirely gas. I kept a careful account of the cost of coal and of the cost of gas; and I was astonished to find that by using gas alone I saved just under 33⅓ p.ct. This was such an enormous saving that I thought my figures must be wrong; so I submitted them to an independent person, who checked them carefully, and found that they were absolutely right. In the town in which I live the gas is supplied by a company, and the electricity is furnished by the district council, so that any deficit on the working of the electricity undertaking has to be made up by the ratepayers. If that is going to happen all over the country, it will be a monstrous iniquity. Do not be afraid to stick to your stock. See the matter through.

The resolution was then put to the meeting, and carried unanimously.

THE DIVIDENDS.

The GOVERNOR: I will now ask the Secretary to read the minute of the Court of Directors recommending dividends for the past half-year.

The SECRETARY thereupon read the following from the Directors' minutes of Jan. 21:

> Resolved, that it be recommended to the Ordinary General Meeting of Proprietors to be held on the 5th proximo (1) that the sum of £15,000 be set aside out of the divisible profits of the Company for the half-year ending on the 31st day of December last towards the redemption fund, in accordance with the provisions of the Company's Acts of 1903 and 1909 and the Gas Light and Coke Company (Charges) Orders, 1921 and 1923; (2) that dividends as follow for such half-year be declared—namely:
>
> | | | | | | |
> |---|---|---|---|---|---|
> | **On the 4 p.c. consolidated preference stock, at the rate of . . . . . .** | **£4** | **0** | **0** | **p.c. per annum** | |
> | **On the 3½ p.c. maximum stock, at the rate of . . . . . .** | **3** | **10** | **0** | **,,** | **,,** |
> | **On the ordinary stock, at the rate of .** | **4** | **17** | **4** | **,,** | **,,** |
>
> All subject to deduction of income-tax.

These recommendations were adopted, on the proposition of the GOVERNOR, seconded by Mr. HENRY WOODALL.

RE-ELECTION OF DIRECTORS AND AUDITORS.

The GOVERNOR: Two Directors (the Hon. Clive Bigham and Mr. Harold Brewer Hartley) retire by rotation in the ordinary way at this meeting, and offer themselves for re-election. They are both most useful Directors, and I hope you will re-elect them. I have much pleasure in moving accordingly.

Mr. HENRY WOODALL seconded the proposition, which was agreed to.

The GOVERNOR: Mr. Reginald James Neville Neville, to whom I referred at the beginning of my speech as having just joined the Board, retires also at this meeting, after a very short spell. It is a pleasure to have him with us, and I move his re-election.

Mr. HENRY WOODALL seconded this, and it was carried.

Thereafter the Auditors (Messrs. John Allen Stoneham and Percy Howard Ashworth) were re-appointed, on the motion of Mr. W. MANN, seconded by Mr. H. RAYNER.

EXTRAORDINARY MEETING.

The GOVERNOR: I call upon the Secretary to read the notice convening an extraordinary meeting, for the purpose of sanctioning the raising of additional money by the creation and issue of debenture stock under, and in accordance with, the powers conferred by the Company's Acts of 1903, 1918, and 1925, and the Acts incorporated therewith.

The SECRETARY read the notice.

The GOVERNOR: Ladies and gentlemen,—I now declare this meeting to be an extraordinary meeting for the purpose mentioned in the notice just read. I have already drawn attention to the fact that the capital account is now over-spent to the extent of approximately £900,000. To this will have to be added the amount overspent by the Brentford Company of £550,000—making in all a total of nearly £1,500,000. In the case of both the Brentford Company and ourselves, great progress in regard to the output of gas has been made since the war, with the consequence that large sums of money have had to be spent on new mains, meters, and stoves. Further, there has been a considerable outlay on new show rooms—a policy we propose, as I have already stated, to extend in the near future, not only in our old area, but also in the newly acquired area, in order to provide our consumers with every facility and to advertise and advance our business. With regard to our manufacturing works, we have so far been fortunate in that, by bringing our old plant up to date, and by adopting new methods of carbonizing, we have been able to cope with the increased demand for gas without incurring much capital outlay. You will see by the balance-sheet that the over-draft on the capital account compelled us to borrow to that extent from the bankers, and such was also the case in regard to the Brentford Company. As there is every indication that our business is expanding, and that further sums will have to be spent from capital, the Directors feel that the time has now arrived when additional capital should be raised. As you are aware, the Company already possess the right to issue £750,000 as redeemable debenture stock; and now that we have amalgamated with the Brentford Company, we have acquired also the unexercised powers that they had in regard to the raising of capital. Before taking steps to raise capital, it is necessary that the sanction of the shareholders should be obtained, and that is the reason for holding this special meeting. Before asking the Secretary to read the proposed resolution, I should like to explain that, although it is not our intention to make immediate use of all the powers we possess, we are, in order to obviate the necessity of calling further special meetings, taking this opportunity of obtaining sanction for the raising of the total amount, including, in addition, such amounts as will be required from time to time to repay certain sums obtained on mortgage by the Brentford Company. The money required for our immediate purposes will in all probability be raised by the issue of redeemable debenture stock. I will now ask the Secretary to read the resolution.

The SECRETARY read the following:

> Resolved, that the Directors be, and they are hereby, empowered at such time or times, and upon and subject to such terms and conditions, as they may think fit, to raise by the creation and issue of redeemable or irredeemable debenture stock in accordance with the Company's Acts:
>
> (*a*) Any sum or sums not exceeding in the whole the sum of one million and seventy-four thousand five hundred and seventy-eight pounds in respect of the unexercised capital powers of the Brentford Gas Company transferred to this Company by the Gas Light and Coke Company's Act, 1925.
>
> (*b*) Any sum or sums not exceeding in the whole the sum of four hundred and fifty thousand and thirteen pounds in respect of the unexercised borrowing powers of the Brentford Gas Company similarly transferred to this Company.
>
> (*c*) The sum of twenty-nine thousand four hundred and fifty pounds in respect of the redemption on Jan. 1, 1926, of mortgage bonds of the Brentford Company of that amount similarly transferred to this Company.
>
> (*d*) Any sum or sums not exceeding in the whole the sum of one hundred and ninety-two thousand two hundred and seventeen pounds for the purpose of redeeming the 6 pct. Brentford redeemable debenture stock issued by this Company under the provisions of the Gas Light and Coke Company's Act, 1925, to the holders of 6 p.ct. redeemable debenture stock of the Brentford Gas Company.
>
> (*e*) Any sum or sums not exceeding in the whole the sum of four hundred and twelve thousand eight hundred pounds for the purpose of redeeming further mortgage bonds of the Brentford Gas Company of that amount transferred to this Company by the Gas Light and Coke Company's Act, 1925, and redeemable at various dates up to and including July 1, 1931.
>
> (*f*) Any sum or sums not exceeding in the whole the sum of seven hundred and fifty thousand pounds in respect of the powers of raising money conferred by the Gas Light and Coke Company's Act, 1903, as amended by the Gas Light and Coke Company's Act, 1918.
>
> Provided that the interest on all debenture stock created and issued pursuant to this resolution shall rank *pari passu* with the interest on the 3 p.ct. consolidated debenture stock of the Company for the time being outstanding.

The GOVERNOR: I have pleasure in formally moving the adoption of this resolution.

Mr. HENRY WOODALL seconded the motion, which was unanimously carried.

WHARNCLIFFE MEETING.

The GOVERNOR: I will now call upon the Secretary to read the notice convening the second extraordinary meeting, for the purpose of considering the Bill now before Parliament.

The SECRETARY read the notice accordingly.

The GOVERNOR: I now declare this meeting to be a second extraordinary meeting for the purpose mentioned in the notice relating to such meeting. Before I address you on the subject of the Bill, the Secretary will read the heads.

The SECRETARY thereupon read as follows:

> Clauses 1, 2, and 3 are formal.
>
> Clauses 4 and 5 propose to increase the Company's borrowing powers to a total amount equal to one-half of the nominal amount of the Company's issued capital for the time being, and to authorize the creation and issue of debenture stock in respect of such borrowing powers. The effect of these clauses, if sanctioned, will be to increase the Company's existing borrowing powers by approximately £4,000,000; but these powers will only be exerciseable with the sanction of a general meeting of the Company.
>
> Clause 6 proposes to authorize the issue in the form of redeemable debenture stock of the debenture stock authorized by clause 5. At times when money is dear and the Company have to pay a high rate of interest for borrowed money, it is found desirable that, where debenture stock has to be issued at a rate exceeding the normal rate of interest the debenture stock should be redeemable, so as to give the Company the opportunity of re-borrowing money at a lower rate of interest.
>
> Clause 7 is a formal clause preserving the existing rights of mortgagees of the Company.
>
> Clause 8 proposes to make all the stocks and debenture stocks of the Company transferable in multiples of £1. At the present time these stocks and debenture stocks are only transferable in multiples of £5.
>
> Clause 9 proposes to increase the amount which the Company may charge for copies of the shareholders' address book, which is at present at the unremunerative rate of 6d. per 100 words. The Company frequently receive applications from persons intending to issue shares in gas and other companies for copies of the shareholders' address book, in order that circulars may be addressed to the Company's shareholders; and it is felt that such applicants ought to pay a sum which will cover the cost of supplying the copies.
>
> Clause 10 enables the Company to require an indemnity before issuing a new certificate or dividend warrant in place of a certificate or warrant alleged to be lost or destroyed. It is thought that a person applying for the issue of a new certificate or warrant ought to accept responsibility in the event of the lost

certificate or warrant falling into the hands of some person who claims independently against the Company.

Clause 11 proposes to enable the Company to pay dividends on their ordinary stock at a rate not exceeding 5 p.ct., even though the authorized rate of dividend under the sliding-scale may be less than 5 p.ct.

Clause 12 deals with the 3¼ p.ct. maximum stock, and is consequential on the preceding clause.

Clause 13 proposes to repeal the power conferred by the Company's Act of 1925 to create and issue ordinary stock or preference stock for the purpose of the redemption of mortgage bonds of the Brentford Gas Company transferred to the Company by that Act in connection with the taking over of the Brentford undertaking, and of certain redeemable debenture stock which the Company were required by that Act to issue to holders of the Brentford Company's redeemable debenture stock. The Act of 1925 gave the Company the alternative of raising money required for these purposes either by borrowing or by the issue of ordinary or preference stock. The retention of the power to issue ordinary or preference stock would involve a considerable claim for duty in respect of an increase of the Company's nominal share capital; and as there is no intention of exercising this power, it is proposed to repeal it, and thus to relieve the Company from the obligation of paying the duty.

Clause 14 proposes to make certain formal amendments in the complicated provisions applying to the fund which the Company were required by the Act of 1903 to form for the purpose of redeeming obsolete capital.

The GOVERNOR: Ladies and gentlemen,—You have just had read to you the headings of the Bill which is being laid before Parliament during the coming session. Its main points, as you have probably noticed, are the obtaining of further capital borrowing powers and the right to pay a dividend of not less than 5 p.ct. on the ordinary stock, notwithstanding the provisions of the sliding-scale. With regard to the first point, I gave you a few moments ago the reasons that rendered it necessary for us to make use of the powers we already possess for raising capital. The next step is to make provision for the future, and the powers we seek—viz., the right to borrow as loan capital a sum up to one-half of the nominal amount of ordinary and preference capital issued by the Company—are in accordance with precedent, and will, if granted, make it possible for the Company to push their business without fear of being hampered by want of capital during the next few years. I may say, however, that the policy of the Company in regard to capital expenditure will not in any way be changed in consequence of the fact that further powers will, as we hope, be granted to us; and every care will be taken to see that expenditure on this account does not become excessive. It may interest you to know that an increase in output of 4 p.ct. justifies the spending in a year of as large a sum as £750,000 on capital purposes. I do not say this is what we do; but it shows the enormous size the undertaking has now attained. With regard to the provision as to the dividend on the ordinary stock, I think there is ample justification for the proposal we are putting forward. It is hoped that, with the proposed limit, the value of the ordinary stock on the market will become steadier, and that the beneficial effect of this will be apparent whenever it is necessary for the Company to issue further ordinary stock. It is felt that things have changed very much since the principle of the sliding-scale was first adopted. There is now, for instance, no monopoly so far as the sale of gas is concerned. Every gas Company is placed upon its mettle by keen competition to sell gas as cheaply as possible; and it is not so necessary now for the sliding-scale to act as a restriction as was formerly the case. There will still be the incentive to sell gas as cheaply as possible in order to increase the dividend above the 5 p.ct.; and to this extent the sliding-scale principle will remain in operation. I sincerely hope that our suggestion will recommend itself to Parliament. There is one more point in the Bill that I should like to refer to. It is with regard to the change of the multiple from £5 to £1 for transactions on the Stock Exchange in connection with all descriptions of our share capital and debenture stocks. It was felt by the Directors that such a change would enable many who otherwise could not afford it to become shareholders of the Company. In the case of co-partnership, the benefit will be particularly marked, as it will no longer be necessary for a co-partner to wait until sufficient bonus has been granted to purchase £5 of stock, as is the case at present; and therefore as a whole the co-partners will be enabled to possess a much larger holding in the Company. I have much pleasure in moving:

> That the Bill now submitted, intituled: "A Bill to confer additional borrowing powers upon the Gas Light and Coke Company, and for other purposes," be, and the same is hereby, approved, subject to such alterations as may be made in the Bill by Parliament and approved of by the Directors.

The motion was seconded by Mr. HENRY WOODALL, and carried unanimously.

The GOVERNOR: That, ladies and gentlemen, concludes the business.

A VOTE OF THANKS.

Mr. W. A. HOUNSOM: I venture for once to differ from the concluding words of the Governor. I do not think the business of the meeting has quite concluded; for on this side of the table I am quite sure that a resolution conveying the thanks of the meeting to the Governor, the Directors, the officers, and the co-partners one and all, would be an acceptable one for me to move; and I have very great pleasure in doing so. I believe it is entirely in accord with the spirit which the Governor enunciated a few minutes ago in regard to co-partnership. To-day we are all linked together in this great Company's work. We on this side of the table endorse the welcome which the Governor has extended to Mr. Neville, who comes here to assist in the united work of the Board in this great and growing district. That there must be anxieties in the future as in the past we are fully aware; but the Company are in the van now, and we want to endorse everything that is done to promote that spirit of helpfulness which we need nationally and internationally. We want a sense of responsibility developed in each individual. That is one of the things lacking at the present time. With the spirit of co-partnership right through, we shall go forward in the great service which the gas industry is rendering to the community at large.

Mr. F. W. CHURCH seconded the vote, which was cordially passed.

The GOVERNOR: On behalf of myself and my colleagues, and all the co-partners of the Company, I thank you very heartily indeed for the encouragement and appreciation conveyed by the vote. I can assure you that it is a very great pleasure to me and to the other Directors to work together as we do so amicably with such a large number of officers and men connected with the Company. It makes one's task so much easier to know that one is at the head of an absolutely united Company, all working for the cause.

FRENCH COAL TAR INDUSTRY.

[From the "Iron and Coal Trades Review."]

The United States Commercial Attaché in Paris has submitted to his Government a report on the production and employment of coal tar in France, from which we extract the following particulars.

The works which are members of the Central Committee of French Tar Producers and Distillers, and which furnish about two-thirds of the French coal tar output, have produced the following quantities during the past five years:

—	Coal Tar. Tons.	Distillates. Tons.
1920	..	189,525
1921	168,129	222,210
1922	181,760	240,811
1923	225,740	306,338
1924	290,592	340,863
1925*	305,000	275,000

* Provisional estimate.

The following estimates and particulars are given for the years 1924 and 1925 with regard to the total coal tar production of France, the supplies obtained from the Saar and Ruhr territories, and the purposes for which the coal tar was employed:

—	1924 (Tons.)	1925. (Tons.)
Available supplies of coal tar	455,000	435,000
Including French production	410,000	425,000
Including Saar and Ruhr	45,000	10,000*
Employed in road making	97,000	150,000
Including raw tar	80,000	..
Including distillation residues	17,000	..
Other purposes	8,000	10,000
For distillation	350,000	275,000
By producers themselves	260,000	..
By distillation works	90,000	..

* Saar territory alone.

The coal tar production of 410,000 tons in 1924 is made up of 235,000 tons from gas-works and 175,000 tons from coke-works. Compared with the preceding year, the estimates for 1925 indicate a decrease of 75,000 tons in tar distillation, the principal result of which is a decline in products such as phenol and naphthalene. Great efforts are therefore being made in various official quarters, in conjunction with the parties interested, to get the consumers to employ the distillation residues of coal tar instead of crude tar.

To the production of France itself (with the import from the Saar territory) must be added the considerable imports of tar from abroad, which is used chiefly for road tarring. These imports amounted in 1922 to 257,378 tons, in 1923 to 358,222 tons, and in 1924 to 327,029 tons. Since the beginning of 1925 the countries of origin are indicated in the import statistics. From these it appears that England is by far the largest source of supply for coal tar. Of the amount imported in the first half of 1925—viz., 148,702 tons—no less than 131,805 tons came from Great Britain; while Germany supplied only 2582 tons and other countries only 14,315 tons together.

The French export of coal tar is comparatively unimportant. The official trade statistics show under the heading "Coal Tar and Pitch" an export of 34,128 tons for 1922, 17,075 tons for 1923, 12,820 tons for 1924, and 28,960 tons for the first six months of 1925.

Gas Light and Coke Company's Standard Price.—Early last December, the London County Council decided, in connection with the application of the Gas Light and Coke Company to the Board of Trade for an Order under section 1 (3) of the Gas Regulation Act, 1920, to permit of an increase in the Company's standard price of gas, that representations should be submitted to the Board to safeguard the Council's interests, but that no definite objection should be offered to the Company's application. Objections were, however, advanced by other local authorities in the Company's area of supply, and the Board decided to hold a public inquiry. In the circumstances, the Public Control Committee were of opinion that the Council could not well avoid being represented at the inquiry, without adversely affecting their position in connection with future applications. The Committee have accordingly arranged for Counsel to be retained in connection with the submission of the Council's representations at the inquiry.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

There has been an easier tendency in the market during the past week, though gas coals have been least affected of any class. Collieries on the whole have maintained their prices, being in a satisfactory position for some time ahead. But inquiry has not been so good, and many contractors are offering "second-hand" coal at slightly reduced quotations.

Durham positions are firm for the next few weeks, but, for the end of the month and early March, there is coal offering. Gas makes are the firmest section; but coking sorts maintain quotations, though the demand has eased somewhat.

Nominal prices are 19s. to 19s. 6d. for Wear Special gas, 18s. 6d. for best qualities, and 16s. 6d. to 16s. 9d. for seconds. Coking is about 16s. to 16s. 6d., and bunkers are about 17s. 6d. for best makes.

Inquiry for coke has also decreased, and, though order books are full for the next few weeks, forward prospects are not so bright as they have been. Prices for gas coke are 23s. to 25s. f.o.b.

The somewhat cynical view of the weaker tendency held in some quarters is that much of the recent buying has been for stocking in anticipation of possible trouble, and that settlement prospects are now brighter. If this is the case, there can be no doubt that the trade would benefit more by settled conditions than by any temporary rise in prices. Business is still considerably hampered by the uncertainty regarding the second half of the year.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The demand for house coal has fallen off during the past week by reason of the milder weather. This applies particularly to the Metropolitan area.

Collieries, however, report full order books, and, generally speaking, are working maximum time.

The industrial situation does not improve, and evidently consumers of fuel are concerned in respect of forward purchases and the eventual settlement, or temporary settlement, of the present coal trade difficulties, having, as it must, a bearing on the cost of fuel. The washed descriptions retain their value, although some of the commoner unscreened qualities are not making as much as they did in December.

The gas coal situation is rather spasmodic, and in accordance with the position at each supplying colliery. In some instances contracts have been booked covering a period of twelve months and slightly over, while in others, with a small output and settled geographical markets, the producers display a waiting tendency. Contracts already booked for forward delivery are at prices rather in excess of those of last year.

Exporters report their business as being from day to day, with few inquiries for forward at anything like the prices that the Humber supplying collieries are quoting.

The following are the Humber bunker and export prices (f.o.b. usual shipping ports): South Yorkshire—Hards, Association, 21s. per ton; screened gas coal, 21s. to 21s. 6d.; washed doubles, 20s.; washed singles, 18s.; washed smalls, 13s. to 13s. 3d.; unwashed doubles, 17s.; rough slack, 10s. to 10s. 3d.; smithy peas, 19s. to 20s. 6s. West Yorkshire—Hartley's (f.o.b. Goole), 18s. 6d.; washed doubles, 18s. 6d. to 19s.; washed singles, 17s. to 17s. 6d.; washed smalls, 13s.; unwashed doubles, 14s. 6d.; rough slack, 10s. to 10s. 3d.; coking smalls, 10s. Derbyshire and Nottinghamshire—Top hards, 21s. to 22s. 6d.; washed singles, 17s. 6d. to 18s.; washed smalls, 12s. 9d.; rough slack, 10s. to 10s. 3d. Yorkshire, Derbyshire, and Nottinghamshire: Screened steam coal, 19s.; gas coke, 24s. 6d. to 26s.; furnace coke, 19s. to 20s.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

There has been a sharp relapse in the market. With severe weather giving place to mild conditions, the call for household coals has fallen off abruptly; the decline being most pronounced in the best grades. The demand for steams likewise has a hesitating tendency. A steady consumption of D.S. nuts and beans is indicated, and slack remains a saleable commodity. In other directions, however, values are not maintained without difficulty. Railway transport is working more freely, partly because the pressure of demand is relaxed and partly because improved traffic arrangements have been introduced at converging points in the Midland territory. With a smaller consumptive demand the danger is lest congestion should arise at the terminals rather than en route. Most of the pits are working with fair regularity, as collieries have still a good many orders on the books which were placed when the exigencies of demand were more insistent. New business is being placed very cautiously, however.

There is no more animation than of late in the gas coal market. Hard cokes are very firm. A moderately brisk demand from the smelters is reinforced by the requirements for heating purposes, which are considerable.

Furnacemen who were buying medium grades at about 13s. at ovens in the last quarter are now paying round about 15s. for a corresponding quality. The advance is greater to other than iron trade users. It does not appear that any steps have been taken to bring ovenmen and furnacemen together again for the discussion of re-stabilization.

L.C.C. and the Gas Light and Coke Company's Bill.—At the meeting of the London County Council on the 2nd inst., it was resolved to oppose the Gas Light and Coke Company's Bill, and that the costs and expenses of, and incidental to, the opposition be paid out of the county fund.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 8.

Interest continues to be maintained in pitch for both prompt and next season's shipment. It is reported that 60s. per ton has been paid, and the price is firm at not below this figure.

Creosote is steady and unchanged at 7¼d. to 7¼d. per gallon in bulk at makers' works.

Tar continues in demand, and the price is hardening in sympathy with the advance in pitch.

Pure benzole and pure toluole are steady at about 2s. 2d. to 2s. 3d. per gallon. Solvent naphtha, 95/160, is 1s. 10½d. per gallon.

There is more inquiry for pyridine, which is firm at 19s. 6d. to 20s. per gallon.

Tar Products in the Provinces.

Feb. 8.

The markets for tar products remain firm generally.

Pitch has improved somewhat, and closes very firm indeed—60s. is reported to have been obtained on the East Coast for this season and 59s. for next season.

Creosote is firm, but without any alteration in price.

Benzole is steady, with keen demand for supplies over the summer months.

Solvent naphtha is a little easier, and there does not appear to be quite so much demand for forward delivery.

Heavy naphtha is neglected.

Carbolic acid is quieter owing to the absence of demand for crystals carbolic at the advanced prices.

Cresylic acid is steady.

Naphthalene is neglected, and anthracene practically unsaleable.

The average values for gas-works products during the week were: Gas-works coal tar, 40s. 9d. to 45s. 9d. Pitch, East Coast, 59s. to 60s. f.o.b. West Coast—Manchester, 53s. 6d. to 54s. 6d.; Liverpool, 54s. to 55s.; Clyde, 57s. to 58s. Benzole, 90 p.ct. North, 1s. 8½d. to 1s. 9½d.; crude, 65 p.ct., at 120° C., 1s. 1d. to 1s. 2d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 8½d. to 1s. 9½d. Toluole, naked, North, 1s. 8d. to 1s. 9d., nominal. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 7½d. to 1s. 8½d. Heavy naphtha, North, 11½d. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 6d. to 6¼d.; Scotland, 5¾d. to 6d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Manchester District Tar Prices.

The average price realized for the sale of tar in the Manchester district, according to the sliding-scale, for the month of November was £2 10s. 5·13d.

TRADE NOTES.

"T.I.C." Plant for Johnstone.

The Engineer and Manager of the Johnstone Gas Department, Mr. Walter A. Dearden, on behalf of his Council, has placed an order with the Woodall-Duckham Companies for a combined "T.I.C." (lead bath) tar treatment and bitumen melting and mixing plant. The tar plant will be capable of treating 20 tons of crude tar per 24 hours.

British Industries Fair.

Messrs. Sperryn & Co., and Messrs. Ingram & Kemp, of Moorsom Street, Birmingham, invite visitors to the Fair to inspect their model works and equipment.

Metallic Packing.

A 140-page booklet on this subject, containing much hitherto unpublished information with regard to packing service and stuffing-box design, is published by Crane Packing, Ltd., of Slough. This text book deals with the development, uses, and correct application of metallic packing to modern equipment, and not only covers ordinary packing requirements, but takes into consideration many special problems which have been solved only by careful study and extensive experimental work.

CONTRACTS OPEN.

Silica and Fire-Clay Goods.

The Gas Committee of the City of Leeds are inviting tenders for silica and fire-clay goods. [See advert. on p. 370.]

Resetting Retorts.

Tenders are invited by the Gas Department of the Borough of Warrington for the resetting of retorts. [See advert. on p. 370.]

General Stores (Tubes, Paint, Mantles, &c.).

The Stoke-on-Trent Gas Department are inviting tenders for a twelve months' supply of general stores and materials. [See advert. on p. 370]

Purifier Covers and Gasholder.

The Gas Committee of the Knaresborough Urban District Council are inviting tenders for purifier covers and a three-lift gasholder. [See advert. on p. 369.]

Inclined Retorts.

The Gas Department of the Spenborough Urban District Council are inviting tenders for the renewal of two beds of inclined retorts. [See advert. on p. 370.]

PUBLIC LIGHTING AT TOTTENHAM.

Departmental Dinner.

The second annual dinner of the Public Lighting Department of the Tottenham District Light, Heat, and Power Company took place on Saturday, Jan. 30, at the Tottenham G.A.S. Club, Willoughby Lane. Mr. A. M. Bell (Public Lighting Superintendent) presided over the gathering of 57, which included Mr. E. J. K. Fussell, Mr. S. B. Chandler, and Mr. A. H. Richardson. Mr. H. C. Smith and Mr. J. Ledingham were unable to be present. After the Loyal Toast had been duly honoured, the company listened with enjoyment to a musical programme provided by the employees of the department. The toast of the "Guests and Visitors" was proposed by Mr. H. E. McGregor, who referred in appreciative terms to the conditions of service with the Company, mentioning in particular the benefits of co-partnership and superannuation, and the provision by the Board of Directors of the splendid sports ground and club premises. Mr. Fussell, responding, said he much appreciated the work the men of the department were performing. Mr. Chandler, proposing the toast of the "Public Lighting Department," gave some interesting facts. The number of public gas lamps in the area served by the Company was 6142, of which number 227 were additional lamps lighted during 1925. These lamps consisted of 12,720 burners; and during the past year 59,000 mantles were used for replacement purposes, which showed the average life of a gas mantle used for public lighting to be just under three months—a satisfactory figure considering the exposure and traffic vibrations the mantle had to withstand. He congratulated the men upon the way they carried out their duties; and that they were giving efficient service was proved by the splendid condition in which the lamps were maintained. That the brilliance of the lamps had been noticed by those in authority was evidenced by the fact that orders had been received, and were still being received, to fix gas lamps in thoroughfares previously lighted by competitors. The Chairman, in reply, said he felt sure that whatever success had been achieved was the result of the splendid spirit of goodwill and co-operation which existed throughout the department. Mr. A. R. Gooderham proposed the toast of "The Chairman," which was received with musical honours.

ASSOCIATION OF SUPERANNUATION AND PENSION FUNDS.

The report of the Association for the year 1925 indicates progress and activity. The list now includes 173 members—among whom a number of gas companies are represented—having increased from 55 in 1923, when the Association was established. Apart from services rendered to individual members, three main subjects have engaged the Council's attention, affecting superannuation funds generally. These are briefly indicated in the following paragraphs.

It is desired to secure the extension to widows' and orphans' annuity funds of the income-tax concessions granted to approved superannuation funds under section 32 of the Finance Act of 1921. So far the Treasury has not conceded this point; but the effort is being renewed in the hope of attaining the object in this year's Finance Bill.

The Inland Revenue Authorities hold that superannuation fund trusts must be limited in duration, so as to comply with the rule against perpetuities; and the Council of the Association are endeavouring to establish the position that this rule of law does not apply to such trusts, as they consider that its application is in many ways harmful to funds.

The Council raised a guarantee fund in connection with the appeal to the House of Lords of the British Insulated and Helsby Cables, Ltd., against the judgment of the Court of Appeal disallowing, as a working expense, an initial payment of £31,784 made to their pension fund in 1916. The appeal was lost by a majority of only 3 to 2.

These activities indicate the nature of the Association's work, which is designed to promote by united action the interests of superannuation and similar funds, and to give individual advice and information on all subjects connected with such funds. The address of the Association is 55, Broadway, Westminster, S.W. 1.

Dougall's Gas Meters has been registered as a Company, with a capital of £20,000, to acquire the business of a gas meter manufacturer carried on by Mr. J. Dougall as the Chiswick Meter Works, at 70, Strand-on-the-Green, Chiswick.

Whitchurch and Electricity.—The Whitchurch (Salop) Urban Council last week had before them a letter from the local Gas Company calling attention to the various grounds on which the Company might be expected to distribute electricity in the Whitchurch area on more favourable terms than the Gwennedd Trust, and expressing the hope that the Council might see their way to give the Company the same courtesy as had been extended to the Trust, by granting them another interview with the Council. Mr. Baker Smith urged that application should be made to the Commissioners for a local inquiry. It was eventually decided to inform the Solicitor for the Gas Company (Mr. A. G. Eccleston) that the Council could not now see their way to re-open the matter.

Sale of Coke by Weight.—The opinion was expressed by the London County Council, in July, 1924, that legislation should be initiated by the Government providing that all coke should be sold by weight; and they suggested it should be made an offence to water coke with a view fraudulently to increasing its weight. In view of the fact that the Food Council are considering the question of recommending the initiation of legislation to deal with short weight and measure in the sale of foodstuffs, the Public Control Committee consider that the time is now opportune for giving legislative effect to the suggestions of the Council contained in the resolution mentioned above. They have accordingly asked the President of the Board of Trade to consider as to the inclusion in any Bill dealing with short weight and measure of a clause to amend Part II. of the Weights and Measures Act, 1889, so as to bring coke under the same control as coal, and otherwise to give effect to the Council's resolution.

Electricity v. Gas at Rowley Regis.

The question of whether electricity should be substituted for gas for power purposes was raised at a meeting of the Upper Stour Valley Main Sewerage Board, on Feb. 2, when the Engineer called attention in his report to the fact that the supply of gas to the air compressors at the Tividale outfall works had been irregular for some time past, and at times insufficient for working. He had taken the matter up with the Manager of the Rowley Regis and Blackheath Gas Company, who said that the trouble had arisen through defects in the main from Tipton Road to the Board's engine-house. He suggested that the laying down of a 3-in. main, instead of the present 2-in. one, would overcome the difficulty. The cost of laying down the new main would be £84, and the Company offered to bear half the expense. Mr. J. B. Holden urged that the time was opportune for the electrification of the plant at the works, especially as there were facilities for such a scheme. The Engineer expressed the view that it would not be to the advantage of the Board, as continual pumping had to be carried out, and gas was more suitable for this purpose. Eventually it was decided to accept the offer of the Gas Company.

Christchurch (N.Z.) Gas Company.

On Dec. 16, the "Lyttelton Times" issued a special anniversary day supplement, entitled "Canterbury's Seventy-Five Years," and dealing with the foundation and development of the province. An entire page was occupied by an announcement of the Christchurch Gas, Coal, and Coke Company, Ltd., who pointed out that the progress of Canterbury and the growth of the Christchurch Gas Company are synonymous terms. The Company was formed in 1863, and gas was first supplied to the town in the following year. The nature of the progress that has since taken place is indicated by the fact that in 1875 there were 20 miles of mains to supply 800 consumers, while for 1925 the figures were 250 miles of mains and 21,601 consumers. Rapid development of the suburbs during the last few years has necessitated the adoption of a comprehensive scheme of trunk main extension to the outlying districts. In other directions, too, a progressive policy is being followed by the Company, under the able guidance of Mr. R. C. Bishop (General Manager) and Mr. Francis W. J. Belton (Engineer). The Company are among the largest employers of labour in the city; the staff numbering 262.

William L. Shepherd & Co., Ltd., have been registered as a Company, to carry on the business of dealers in tar, bitumen, &c., chemical manufacturers, and merchants. The nominal capital is £1000 in £1 shares.

Growth of Gas in Bristol.—On Jan. 25, Mr. S. E. Halliwell, Secretary and Commercial Manager of the Bristol Gas Company, and Mr. A. Edbrooke (Assistant Secretary) read papers dealing with gas company administration, before the Chartered Secretaries Students' Association. Mr. Halliwell gave some figures showing the enormous growth of gas in Bristol. In 1900, the number of consumers was 30,033, and the gas sent out 2062 million c.ft. In 1925 these totals had increased to 81,566 and 3905 million c.ft. respectively. Last year the cookers on hire amounted to over 71,000, while 25 years ago they numbered only 13,000. Last year's demand for gas constituted a record in the history of the Company. Mr. Edbrooke's paper was in the nature of a supplement to Mr. Halliwell's.

Tottenham District Light, Heat, and Power Company.—Next Tuesday the Directors will submit the statement of accounts for the year ended Dec. 31, 1925. The Tottenham Gas (Charges) Amending Order, 1925, issued by the Board of Trade under date of April 6, 1925, fixed a new standard price of 13·8d. per therm. The reduction in the standard price from 17·6d. to 13·8d. per therm, together with the serious fall in the market values of bye-products, which took place in the early part of the year and necessitated an increase in the price of gas at Lady Day, 1925, accounts for the smaller dividends the Directors are able to recommend. The accounts show, after payments of dividends in respect of the half-year ended June 30, 1925, at the full statutory rates of 5½ p.ct. and 5 p.ct. per annum on the preference stocks; 7⅜ p.ct. on the "A" stock; 5⅞ p.ct. on the "B" stock, all less income-tax, and providing for interest and all other charges, a balance to be carried forward of £39,538. The Directors recommend the payment of dividends, in respect of the half-year ended Dec. 31, at the same rates. The quantity of gas sold shows an increase over the previous year of 4·06 p.ct. The Directors record the death of Mr. Hubert Dynes Ellis, who so ably served the Company as a Director for a period of nine years. The vacancy thus caused was filled by the appointment of Mr. Thomas Goulden, M.Inst.C.E.

The Bradford Corporation Gas Committee have acceded to an application by Messrs. Brown & Polson, manufacturers of corn-flour, &c., that the Corporation should fix gas-cooking apparatus and supply gas free in connection with a cookery demonstration to be given by the firm in Bradford.

The Hornsey Borough Council are holding a Clean Milk and Food Exhibition at Christ Church Hall, Edison Road, Crouch End, from March 2 to 5 inclusive. The object is educational, and not in the interests of particular traders; and the programme will include cookery demonstrations with smokeless fuel.

A decision by the Newcastle (Staffs) Gas Committee not to grant an interview with representatives of the National Union of Gas Workers on the question of the grading of the men at the local gas-works, was brought up at the meeting of the Council on Wednesday last (Feb. 3). Mr. G. H. Fenton appealed to the Chairman of the Gas Committee to agree to an amendment to the effect that the interview be granted. The amendment to grant the interview was lost; but a second amendment to refer the matter back for further consideration was carried.

STOCK MARKET REPORT.

OWING to the fall in values of Rubber and Oil shares, there was some anxiety with regard to the Settlement last week, but, except for one small failure, the trouble was overcome. The enforced liquidation of certain securities, however, left some markets in a disturbed condition. Under the lead of British Government stocks, which were assisted by plentiful money supplies, investment stocks were in good fettle. The fears expressed of a confiscatory proposal in respect of the 5 p.ct. War Loan are reported to be without foundation. The suggestion put forward in the House of Commons last week that the interest should be reduced to 4 p.ct. is not likely to receive the support of any responsible Government.

Among new issues, Liverpool Corporation are asking for £3,000,000 5 p.ct. stock at par; and judging by previous results, it is expected that some portion will be left with the underwriters.

Gas Stocks, under the influence of the Government's electricity proposals, continued in a depressed state. It is interesting to note that the "Times," in commenting on the protest made by the Governor of the Gas Light and Coke Company at the meeting on Friday last, said: "It is impossible not to realize that there is reason in the request of the gas industry that a pledge should be given that the new Bill shall contain safeguards against unfair competition."

It will be seen that the Gas Light ordinary stock dropped a further point, to 80-82, and the South Suburban 1½ points, to 98-101. The Sheffield three stocks and Newcastle consolidated appreciated 1 point at the local exchanges. The good yields of most of the stocks on the subjoined list warrant the attention of investors with a knowledge of and confidence in the industry. Another dividend announcement is that of the Tottenham Company; the Directors recommending the payment of £7 7s. 6d. p.ct. per annum on the "A" stock and £5 17s. 6d. p.ct. per annum on the "B" stock, for the past half-year. These are the same rates as those paid for the previous half-year, and are in each case 12s. 6d. p.ct. below those for 1924.

The following transactions were recorded during the week:

On Monday, Aldershot 4 p.ct. preference 72, Alliance and Dublin 70⅜, 71⅛, Bombay 18s. 9d., Cape Town and District 4¼ p.ct. debenture 71½, Commercial 4 p.ct. 80, 82, 3 p.ct. debenture 55⅛, European 6, Gas Light and Coke 81, 81¼, 81⅜, 81⅛, 81⅞, 4 p.ct. preference 77½, 3 p.ct. debenture 58⅜, 59½, Imperial Continental 135½, 136, 137¼, Primitiva 11s. 3d., 11s. 9d., South Metropolitan 94, South Suburban 5 p.ct. 98, 5 p.ct. debenture 94½, Wandsworth (Wimbledon stock) 100.

On Tuesday, Commercial 4 p.ct. 80, 3 p.ct. debenture 56, European 6, Gas Light and Coke 81⅛, 81⅜, 3 p.ct. debenture 59½, Imperial Continental 135, 135½, 136½, Primitiva 11s., 11s. 6d., 11s. 7½d., South Metropolitan 93½, 93¾, 94, 94⅜, 3 p.ct. debenture 57½, South Suburban 5 p.ct. 99½. Supplementary prices, Croydon 7⅛ p.ct. preference 105, Redhill 5½ p.ct. preference 89½, 90, Wandsworth 3½ p.ct. 93.

On Wednesday, Brighton and Hove original 173, 173½, 174, European 6¼, Gas Light and Coke 81, 81½, 81⅜, 4 p.ct. preference 77½, Imperial Continental 136½, Primitiva 11s. 1¾d., 11s. 4½d., 11s. 6d., South Metropolitan 93½, 94, 94⅝, Tottenham "A" 110, Wandsworth (Wimbledon stock) 100. Supplementary prices, Brighton and Hove 6 p.ct. "B" preference 102, 5 p.ct. debenture 95½, Liverpool 5 p.ct. 84½, Malta and Mediterranean 2nd (7½ p.ct. preference) 97s. 6d., 100s.

On Thursday, Alliance and Dublin 71½, Bournemouth 6 p.ct. preference £11 6s. 9d., £11 9s. 3d., Gas Light and Coke 81½, 81⅜, 4 p.ct. preference 77½, Imperial Continental 136½, 137½, South Metropolitan 93½, 93⅜, 94. Supplementary prices, Croydon 7½ p.ct. preference 107, Malta and Mediterranean 2nd (7½ p.ct. preference) 100s., Metropolitan (of Melbourne) 9⅞.

On Friday, Brighton and Hove 173, 173½, 174, "A" 138½, European 6, 6¼, Gas Light and Coke 80½, 81, 81½, 81⅛, 81⅜, Imperial Continental 136, 137, Montevideo 71, Oriental 101½, Primitiva 11s. 1¾d., 11s. 6d., 11s. 7¾d., South Metropolitan 93½, 3 p.ct. debenture 57½, 58, 58¼, 6½ p.ct. debenture 104½, South Suburban 5 p.ct. debenture 96½.

There were ample supplies of credit in Lombard Street at the end of the week, though the growing tendency to apply for Treasury Bills reduced available balances. There was a further decline in the average rate; and while the full amount offered was not allotted, there was a reduction of over 2s. 10d. p.ct. compared with the previous week. The rate—£4 9s. 11·41d. p.ct.—was the lowest since the Bank Rate was increased from 4 to 5 p.ct. on Dec. 3. Discount rates eased up in consequence.

In the Foreign Exchange Market sterling was a little easier, and the New York rate closed ⅛ lower at 4.86⅛. The European gold exchange remained unaltered. French francs weakened to 120⅜; but Belgians were unchanged at 106.97½. Italian lire were quoted lower at 120.72½.

Silver gave way to 30 1/16d. per oz., owing to Indian sales. Gold remained at the nominal price of 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 5.	Rise or Fall.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb. 4	5	5	Aldershot 5 p.c. max. c.	74—77*	−1	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—74*	−1	72
1,551,868	,,	Oct. 8	6⅛	6⅛	Alliance & Dublin Ord.	69—73	..	70⅜—71½
374,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	58—63	..	..
300,000	1	Oct. 22	1/7½	1/7½	Bombay, Ltd.	7/6—1	..	18/9
170,000	10	Aug. 13	8⅛	8⅛	Bournemouth 5 p.c.	12—13	..	..
425,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	11/6/9 - 11/9/3
50,000	Stk.	Jan. 7	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
214,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	172—177	..	173—174
244,200	,,	,,	9½	9	Do. A Ord.	137—142	..	138½
1,387,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91*a*	..	..
855,000	,,	Oct. 8	7	8	British Ord.	103—108	..	..
100,000	,,	Jan. 7	7	7	Do. 7 p.c. Pref.	117—122	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—74	..	..
100,000	10	Dec. 17	8	6	Cape Town, Ltd.	6½—7⅛	..	..
100,000	10	Nov. 5	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Jan. 7	4½	4½	Do. 4½ p.c. Deb.	68—73	..	71½
636,860	,,	July 23	6	6	Cardiff Con. Ord.	98—101	..	..
237,860	,,	Jan. 7	7⅛	7⅛	Do. 7½ p.c. Red. Deb.	98—101	..	..
157,150	,,	Aug. 13	6¼	5	Chester 5 p.c. Ord.	90—95*b*	..	..
73,185	1	Oct. 8	—	2/-	Colombo Ltd. Ord.	25/—27/-	..	..
24,500	1	,,	—	1/4½	Do. 7 p.c. Pref.	21/—23/	..	..
1,513,280	Stk.	July 23	5/14 8	5½	Commercial 4 p.c. Cap.	80—85	..	80—82
550,000	,,	,,	5⅝	5/3/4	Do. 3½ p.c. Cap.	80—85	..	..
475,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	55—58	..	55½—60
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	35—40	..	..
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	88—91	..	..
650,000	,,	Aug. 13	6½	6½	Croydon sliding scale	97—101	..	..
284,975	,,	,,	5	5	Do. max. div.	81—84	..	..
492,270	,,	Aug. 13	9	6	Derby Con.	107—109*c*	..	..
55,000	,,	Dec. 17	4	4	Do. Deb.	74—76*c*	..	..
300,000	,,	Sept. 10	5	5	East Hull Ord. 5 p.c.	88—91	..	..
50,000	,,	Dec. 17	—	5	Eastbourne 5 p.c. Deb.	93—98	..	..
1,002,180	10	July 23	4	6	European, Ltd.	5⅞—6⅜	..	6—6¼
16,413,385	Stk.	Aug. 13	5⅛	5⅛	Gas Light & Coke 4 p.c. Ord.	80—82	−1	80⅛—81⅞
2,600,000	,,	,,	3⅜	3⅜	Do. 3⅛ p.c. max.	59—62	..	..
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	77½
4,761,930	,,	Dec. 17	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58¾—59⅛
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 10	6⅔	6⅔	Hastings & St L. 5 p.c. Conv.	90—95	..	..
258,740	,,	,,	5⅓	5⅓	Do. 3⅓ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	19½—20½	..	..
86,600	Stk.	Aug. 13	10	10	Hornsey 7 p.c.	132—137	..	..
1,976,000	,,	Nov. 19	59	10	Imperial Continental Cap.	134—139	..	135—137½
226,170	,,	Feb. 4	3½	3½	Do. 3½ p.c. Red. Deb.	69—72*	−1	..
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Aug. 13	5¼	5¼	Liverpool 5 p.c. Ord.	84½—85*b*	−½	84½—84½
600,000	,,	Sept. 24	7	7	Do. 7 p.c. Red. Pref.	103—105*b*	..	..
165,736	,,	Aug. 27	8	9	Maidstone 5 p.c. Cap.	118—128	..	..
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 3	7	6	Malta & Mediterranean	4½—5	..	..
541,920	Stk.	Nov. 19	4	4	Montevideo, Ltd.	69—73	..	71
2,061,315	,,	Aug. 13	5	5	Newcastle & Gateshead Con.	72½—73½*d*	+1	..
300,929	,,	,,	4	4	Do. 4 p.c. Pref.	75½—76½*d*	..	..
529,705	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb.	66⅜—67½*d*	..	..
15,000	,,	Aug. 27	12	11½	North Middlesex 10 p.c.	160—170	..	..
75,940	,,	,,	8⅝	8 5/16	Do. 7 p.c.	115—120	..	..
300,000	Stk.	Dec. 3	7	9	Oriental, Ltd.	98—103	..	101½
188,120	,,	Jan. 7	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	110—115	..	..
60,000	50	Aug. 27	14	14	Portsea Island B	93—96	..	..
100,000	50	,,	13	13	Do. C	90—95	..	..
2,289,909	1	—	—	—	Primitiva Ord.	11/—12/-	−/6	11/—11/9
302,600	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	82—84	..	..
600,000	Stk.	Jan. 21	4	4	Do. 4 p.c. Red. Deb. 1911	63—65	..	..
193,744	,,	Dec. 17	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7⅛—8	..	..
125,000	50	Jan. 4	5	5	Do. 5 p.c. Red. Deb.	43—46	..	..
270,000	Stk.	Aug. 27	5⅜	5⅛	Sheffield A	100—102*e*	+1	..
419,968	,,	,,	5⅜	5⅛	Do. B	100—102*e*	+1	..
1,047,000	,,	,,	5⅜	5⅛	Do. C	100—102*e*	+1	..
90,000	10	June 11	6	4	South African	5—7	..	..
6,009,895	Stk.	Aug. 13	6½	5	South Met. Ord.	93—96	..	93½—94⅜
1,895,445	,,	Jan. 7	3	3	Do. 3 p.c. Deb.	56—59	..	57½—58½
734,000	,,	Sept. 10	6½	6½	Do. 6½ p.c. Red. Db.	103—105	..	104½
91,500	,,	Aug. 13	8¼	8¼	South Shields Con.	124—126*d*	..	..
1,187,795	,,	July 23	6½	6½	South Suburban Ord. 5 p.c.	98—101	−1½	98—99½
368,837	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	94—97	..	94½—96½
647,740	,,	Oct. 22	5	5	South'mpton Ord. 5 p.c. max.	78—81	..	..
121,275	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	69—74	..	..
250,000	,,	Aug. 27	7	7	Swansea 7 p.c. Red. Pref.	101—103	..	..
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	July 23	8	7½	Tottenham District A 5 p.c.	110—115	..	110
882,275	,,	,,	6½	5⅞	Do. B 3½ p.c.	88—93	..	..
150,000	,,	July 9	—	28/4	Do. 5½ p.c. Pref.	103—105	..	..
181,255	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	74—77	..	..
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, &	70—71*d*	..	..
197,294	,,	Aug. 27	6⅞	6⅝	Wycombe 5 p.c.	93—98	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	93—98	..	..
91,800	,,	,,	6⅞	6⅝	Do. 5 p.c. Maidenh'd	88—93	..	..
30,000	,,	July 9	9½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	138—133	..	..
255,636	,,	,,	7⅞	7	Do. B 3½ p.c.	109—114	..	..
392,955	,,	,,	6/9/6	5/19/0	Do. C and New	92—97	..	93
352,000	,,	,,	7⅛	6⅝	Wimbledon 5 p.c.	103—108	..	100
98,000	,,	,,	7⅛	7⅛	Epsom 5 p.c.	113—118	..	..
88,416	,,	Jan. 7	8	8	3 p.c. Deb.	55—58	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *Ex. div.

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